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ARCHITECTVRE

ENGINEERING

DECORATION

CONSTRVCTION

NEW YORK
TIMES BUILDING, BROADWAY AND 42D STREET

REGULAR
EDITION

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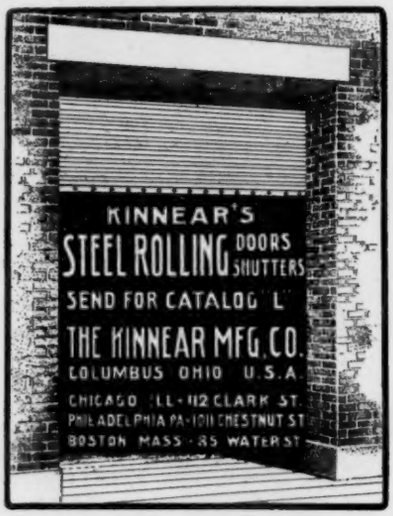

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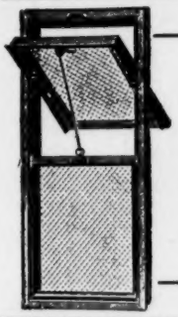

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SOCIETIES

PROGRAMME OF THE THIRTY-EIGHTH ANNUAL CONVENTION, A. I. A., TO BE HELD IN WASHINGTON, D. C., JANUARY 11, 12 AND 13, 1905.—(*Adjourned from December* 15, 1904.)

WEDNESDAY, JANUARY 11.—*Morning Session.*

The members of the Institute will assemble in the Dining Hall, The Arlington Hotel, Washington, D. C., at 9.30 o'clock.

Address of welcome by Major John Biddle, Engineer Commissioner, D. C., at 10 o'clock.

Address of the President, Mr. W. S. Eames.

Report of the Board of Directors.

Report of Treasurer and Auditing Committee.

Reports of Chapters, a synopsis by the Secretary.

Report of the Standing Committees:

(*a*) Judiciary, Alfred Stone, chairman.
(*b*) House and Library, Robert Stead, chairman.
(*c*) Education and Publication, H. L. Warren, chairman.
(*d*) Foreign Correspondence, Glenn Brown, chairman.
(*e*) Contracts and Lien Laws, Alfred Stone, chairman.
(*f*) Applied Arts and Sciences, and on Metric System, William G. Preston, chairman.

Reports of Special Committees:

(*a*) On Government Architecture, Geo. B. Post, chairman. (To be read at afternoon session in connection with papers.)
(*b*) On Examinations and Admission to the Institute, Edgar V. Seeler, chairman.
(*c*) On Co-operation with the Architectural League of America, W. B. Ittner, chairman.
(*d*) On Competitions, Glenn Brown, chairman.
(*e*) On Washington City, W. S. Eames, chairman.
(*f*) On Municipal Improvement, Frank Miles Day, chairman. (To be read Thursday evening.)
(*g*) On World's Congress, T. C. Young, chairman.
(*h*) For Securing Funds for the purchase of the Octagon, J. M. Carrère, chairman.
(*i*) On Nomination for Honorary and Corresponding Members, Frank Miles Day, chairman.
(*j*) Delegate to National Conference, Electrical Code, and to meeting of National Fire Protection Association, Alfred Stone.

Luncheon served in hall at 1 o'clock.*

Afternoon Session, 2 o'clock.

Report of Credentials Committee.

Reports of committees not reached at morning session.

Papers:

"The Relation of the Architect with the Government," by George B. Post.

"The Selection of an Architect for Government Work by Competition," by James P. Jamieson and Irving K. Pond.

"The Selection of an Architect for Government Work Without Competition," to be discussed by C. F. McKim, Thomas Hastings and Joseph C. Hornblower.

Evening Session.

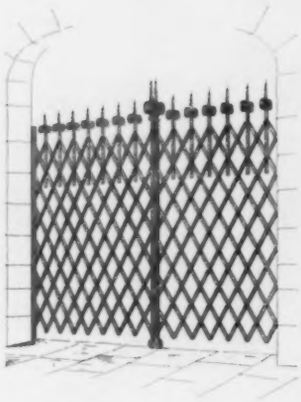
The annual dinner, A. I. A. Subscribers and guests will assemble in annex to Dining Hall at 7.30 p. m. Dinner will be served promptly at 8 o'clock.

THURSDAY, JANUARY 12.—*Morning Session, 10 o'clock.*

Papers:

"The Relations of Architects with Municipal School Work," by Messrs. R. Clipston Sturgis, William B. Ittner and William B. Mundie.

"Financing Building Operations," by W. H. Russell.



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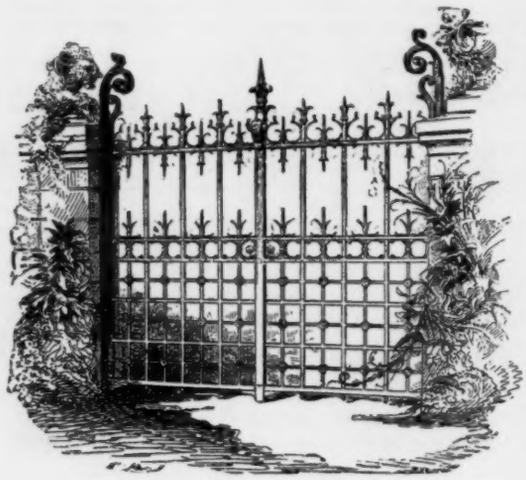

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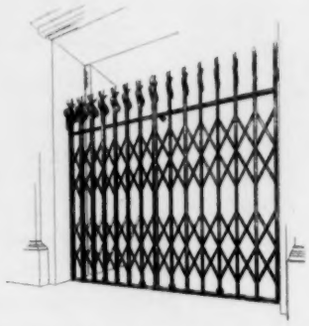

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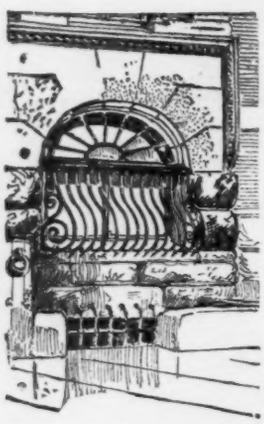

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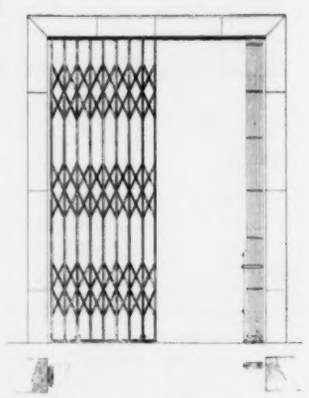

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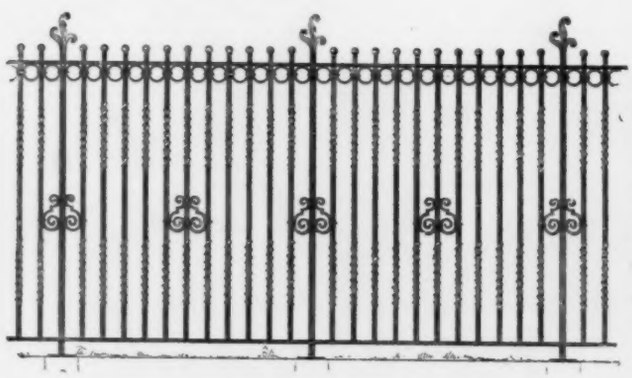

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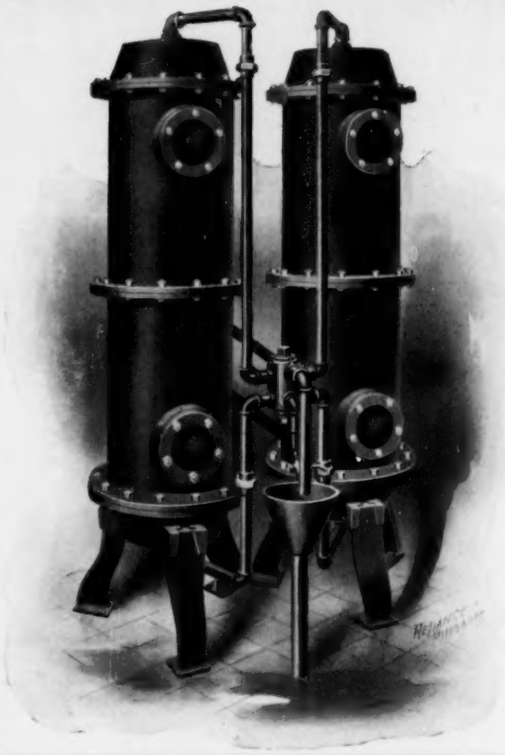

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SOCIETIES—*Continued.*

"Office Organization," by Grosvenor Atterbury.

"Relations of Specialists to Architects," to be discussed by C. T. Purdy and Edgar V. Seeler.

Luncheon served in the hall at 1 o'clock.*

Afternoon Session, 2 o'clock.

Reports of Special Committees not finished at first session.

Action on proposed amendments to By-Laws.

Unfinished business of the previous day.

Report of Nominating Committee and ballots open and distributed for officers and fellows.

Evening Session, 8 o'clock.

Paper:

"Report on Municipal Improvement, Showing the Progress made in the Systematic Grouping of Buildings and Parks Throughout the Country." Illustrated by lantern slides. By Frank Miles Day.

FRIDAY, JANUARY 13.—*Morning Session.*

Depositing ballots for officers and fellows.

Reports of the committees appointed at the first session and their consideration.

Miscellaneous business.

Afternoon Session, 2 o'clock.

Unfinished business.

Report of tellers on election of officers and fellows.

Selection of place for next convention.

Delegates will be distinguished by a red ribbon, and will occupy seats from the front row as far back as is necessary for their accommodation.

Members of the Institute who are not delegates are entitled to take part in all discussions, to offer resolutions and motions, and to vote on a proposition that it is the sense of the meeting.

All sessions will begin promptly at the hours named in the programme. GLENN BROWN, *Secretary.*

Committee of Arrangements—Glenn Brown, Frank Miles Day, W. A. Boring, Leon E. Dessez, Robert Stead.

*Ladies with members are invited to attend all sessions and luncheon.

At a meeting of the Brooklyn Chapter, A. I. A., held November 28, I was instructed by the president and members present to send you a copy of the following resolutions, which were passed by the Board of Directors and unanimously adopted by the Chapter at large:

"WHEREAS, The plan originally given out by the Prison Ship Martyrs' Monument Association, was to hold an open competition for the proposed monument to be erected in Fort Green Park, Brooklyn, N. Y., to the Prison Ship Martyrs of the American Revolution, and

"WHEREAS, The committee having this competition in charge has limited said competition to three firms of architects only, thus excluding all other competitors, and

"WHEREAS, Such limited competition will deprive the nation, State and city of the services of many of the foremost architects and sculptors, preventing many from submitting competitive designs for the proposed monument, an artistic work of national importance, and

"WHEREAS, This form of procedure is strictly against all precedent in securing designs for public monumental work adopted by the leading countries of Europe, and also generally adopted in securing designs for the principal public monumental work in the United States,

"Therefore be it Resolved, That the Brooklyn Chapter A. I. A. hereby formally protests against the proposed limited competition, and the consequent practical exclusion from said competition of all Brooklyn architects and sculptors, and

"Be it further Resolved, That in its judgment such proposed form of procedure is against public policy, on the ground that the expenditure of public funds of the nation, State and city should only be made for a design that is the result of the best competitive and artistic efforts of the leading architects and sculptors of the country, and

"Be it further Resolved, That the Brooklyn Chapter A. I. A. hereby respectfully request that the committee of the Prison Ship Martyrs' Monument Association reconsider their action in limiting the competition, and recommend that an open competition for said monument be inaugurated in accordance with the code of competition adopted by the leading architectural and sculptural societies of America." ALEX. MACKINTOSH, *Secretary.*

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SOCIETIES—*Continued.*

ARCHITECTURAL LEAGUE OF NEW YORK.

The twentieth annual exhibition of the Architectural League of New York will open February 10, in the Fine Arts Building, with the usual dinner.

The League Reception is set for Saturday evening, February 11. The exhibition will be open to the public from Sunday, February 12, to Saturday, March 4, inclusive.

The last days for the reception of exhibits are Tuesday and Wednesday, January 31 and February 1.

The jury of selection will comprise Karl Bitter, E. H. Blashfield, Arnold W. Brunner, Frederic Crowninshield, Frank V. Du Mond, Isadore Konti, Charles F. McKim, H. A. MacNeill, Robert H. Reid, Augustus St. Gaudens, James Knox Taylor and S. B. P. Trowbridge.

NOTES AND CLIPPINGS.

The Lucin Cut-off of the Southern Pacific.—Recently the Southern Pacific completed the Lucin cut-off across the northern arm of the Great Salt Lake. Statistics show that the new road, which saves nearly an hour in time and the heavy grade over the promontory point, also saves $2,500 a day in operating expenses, or nearly $900,000 a year. This cut-off was one of the most expensive engineering enterprises ever undertaken on the Coast, and for many months it was found impossible to prevent the track from sinking because of the quicksand in the bed of the lake.—*New York Tribune.*

Discovery of Platinum in New Mexico.—A large body of rich platinum ore has just been discovered on the Piedro Lumbre grant in Rio, Arabia County. It is owned by local men, and was recently bonded to a Denver mine operator. Placer-gold deposits had been found in the Chama river, near Abiqui, and two men have been prospecting there for some time. After drilling through a bed of gold-bearing gravel for twenty-two feet they struck platinum ore, which the drills pierced for twenty feet before bedrock was struck. It is a solid body rich in platinum. Samples were sent to Denver for assay.—*Exchange.*

The East Boston Tunnel.—The New York *Evening Post* gives the following very satisfactory summary about the the important engineering undertaking just completed in Boston: "The new East Boston tunnel, which extends undereath Boston harbor from the mainland to East Boston on Noddle Island, is one of the longest sub-water tunnels in the world. Its total length is 1.4 miles, although only 2,700 feet of this is under the water. This length is exceeded by the Mersey tunnel at Liverpool, which has 3,960 feet, but it is greater than the Blackwall tunnel at London, and the Port Huron and the Glasgow tunnels. The East Boston tunnel was constructed at a cost of $3,000,000 by the city of Boston, which has leased it for a term of twenty-five years, dating from 1897, to the Boston Elevated Railway Company, which will use the tunnel exclusively for passage of its electric cars between Boston and East Boston. About four and one-half years have been consumed in constructing the tunnel, in the accomplishment of which many difficult engineering problems had to be solved, chiefly on account of the maze of underground pipes, sewers and wires located on the Boston side of the harbor, and also because of the perilous nature of the work of digging the large passageway underneath the bed of the harbor. The tunnel is built entirely of concrete, and is the only tunnel of that kind in the world. It has a maximum width of 23 feet 8 inches, and an average height under the harbor of 20 feet 6 inches. There is a depth of earth between the top of the tunnel and the bed of the harbor of about 20 feet, the lowest point of the tunnel being 90 feet below mean high water. When Boston harbor is dredged, however, to the anticipated depth of 40 feet, the depth of earth covering the tunnel will not exceed five feet. The interior diameter of the tunnel is 20 per cent. greater than that of the St. Clair tunnel and 30 per cent. greater than the Hudson River tunnel. The tube is declared by experts to be absolutely fireproof and practically safe against leakage. The system of ventilation, which is said to be excellent, includes the employment of a duct running through the upper part of the tunnel, with an air exhaust by the use of electric fans. The actual beginning of the tunnel on the Boston side is at Scollay Square, near the subway, and from this point the average time of a trip through the tunnel to the terminal at Maverick Square, East Boston, is expected to be 4½ minutes, although a trolley-car has covered the distance in 1 minute and 56 seconds. The construction of the tunnel was marked by four fatalities to workmen, while many others suffered from "caisson" or air-pressure disease. The Boston Elevated Railway Company will pay as annual rental for the use of the tunnel ⅜ of 1 per cent. of the company's gross receipts, or $45,000 on the basis of last year's earnings. All persons using the tunnel must pay a toll of one cent in addition to the regular car-fare, which passes to the city to pay interest on bonds issued, and eventually to bring about their redemption."

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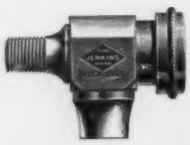
THE WACHUSETT RESERVOIR.

IN the Boston *Transcript*, Mr. L. Fletcher Snapp is giving an interesting account of the new Metropolitan water-system, and the great Wachusett reservoir and dam, from which we make the following extract:

"The conditions which obtained prior to the launching of the Metropolitan scheme for a water supply may now appear to verify the proverb that 'necessity is the mother of invention.' The urgency of the demand for an immediate increase in the water supply was laid bare when, in 1894, statistics showed that in the Metropolitan district, later so designated, the daily consumption of water was 79,046,000 gallons, while the capacity of all sources of supply then available, including the Sudbury reservoir in process of construction, yielded but 83,700,000 gallons, or an excess of but 4,654,000 gallons, and that, according to an established ratio of increase, in 1898 the daily consumption would reach 100,026,000 gallons, or 16,000,000 gallons more than the sources could supply. Furthermore, the same law of increase in population and its correspondent increase in water requirements, as estimated, showed that, in 1915, there would be needed a supply of 173,000,000 gallons; in 1920 the demand would reach 198,000,000, and in 1930 252,000,000 gallons. This, coupled with the additional fact that during the preceding twenty years there had occurred nine years of drought, in which the rainfall during the drier six months had been but thirty-six to sixty-one per cent. of an average amount, presented a situation so grave as to warrant the most heroic measures. The scheme as outlined, therefore, in the report of the Board of Health, was ostensibly designed, first, to meet the immediate demand, that is, for a period of twenty years; and, second, to present a plan of access to sources which would furnish an abundant supply for the future, presumably for all time, but in fact for nearly a century. The scheme involved the absorption into a unit of all existing water works of Boston and other municipalities comprising the Metropolitan district, and the extension of this system by a chain of reservoirs linked together by single and double conduits reaching almost to the western boundary of the State, and sapping the watersheds of nearly 1,400 square miles of territory, with an estimated total yield of 1,118,000,000 gallons a day; this daily yield to be hoarded up in reservoirs having a total capacity of 496,125,000,000 gallons. Measured in gallons this quantity of water is almost inconceivable. But an idea of its immensity may be had from the fact that, granting the present population of the district aggregates 1,300,000 and that it consumes 125,000,000 gallons of water a day and 45,625,000,000 gallons a year, it would require nearly eleven years to drain the reservoirs if not a drop of water flowed into them during all that time.

"In thinking of the largeness of this reservoir one is apt to overlook the fact that it may never be filled to its utmost capacity; at least, until the great artery is run into it from sources farther west which the Metropolitan plan contemplates in an undated future. This proposition resolves itself into a matter of simple arithmetic. While the basin has a storage capacity of 63,068,000,000 gallons of water, the watershed which feeds it is capable of yielding but 105,000,000 gallons a day. Of this daily yield about 75,000,000 gallons is conveyed to the Metropolitan district for the augmentation of nearer supplies. This leaves a residue for storage of but 30,000,000 gallons a day. Were the ratio of increase in the consumption of water suddenly stopped it would require more than six years, at this rate, to fill the reservoir. But the ratio of increase goes on in geometric progression with the ratio of increase in population—about 100 per cent. in ten years, so that with the discontinuance of some older waterworks and the demands of new towns and cities to be supplied according to certain conditions, the filling full of this reservoir is highly questionable and with heavy odds against it. It presents, however, an interesting prospect—this race between the ebbing waters and the consuming capacity of the Metropolitan district. Another thing which adds interest in this connection is the curous fact that where the population becomes more centralized and compact the consumption of water per capita is gradually increased. For instance, in 1895 in the Metropolitan district water was consumed at the rate of eighty-five gallons a day per inhabitant, 100.5 gallons a day in 1898, 115 gallons in 1901 and 119 gallons in 1903.

"This rapid rate of increase in consumption per capita, for some reason, seems to have been wholly unexpected by the Metropolitan Water Board, and for several years past the Board has been inclined to charge it to the extravagance and wastefulness of the consumers, and leakages in pipes. At the same time, the Board presented a substantial reason why the work in constructing certain accessories to the Wachusett system not called for in its prospectus until about 1910 should be completed without further delay. The board, as usual, had its wish granted and all this extra work has been done. And while the promises inferred in the prospectus that $25,377,800 would be ample in accomplishing the entire construction of the Wachusett system and its accessories and deliver its water to all the towns and cities in the Metropolitan district, as a matter of fact the cost, and maintenance of the work when completed next summer will have reached a sum almost twice as great."



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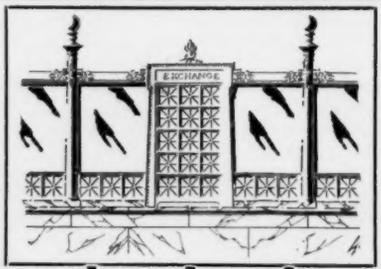

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Societies and Ephemeral Matters. VI

DURING the last few years educators have been giving careful and anxious consideration to the possibility of effecting economies in the time that a man has to spend on his education before he can graduate from a technical or professional school, for, as many take a full professional schooling after a full collegiate course, it has been felt that a system that obliged a man to spend the first twenty-seven or twenty-eight years of his life in mere preparation for work was, considering the average life "expectancy," more than likely to be needlessly wasteful somewhere. By requiring more work in the preparatory schools and by readjusting the curricula followed in the colleges, it is now possible, at Harvard for instance, to get one's bachelor's degree in three years in place of four as formerly, and doubtless further economies can be made under the test of experience. One economy has long been practised by certain colleges and universities which are willing to accept a degree issued by one institution as entitling the holder to enter some of the classes of an institution of a higher grade, without requiring him to waste time in passing an entrance examination. The list of institutions willing to engage in this amiable practice has just been enlarged in a most interesting and unexpected manner, and, since international amity is involved, the matter of graciousness should not escape note. At the solicitation of Mr. Lloyd Warren, chairman of the Committee on Education of the Society of Beaux-Arts Architects, the Ministry of Fine Arts has consented to allow the Society's prize man—the prize is awarded annually, for two years—to compete in the *concours* of the First Class at the Ecole des Beaux-Arts without first having to go through at Paris the preliminary studies and examinations required from Second Class men. As such a privilege as this could only be granted on the submission of proof, the concession cannot but be gratifying to those members of the American society who have devoted themselves so unselfishly to the educational undertakings the Society fosters. Moreover, the act, by itself alone, gives the Society a standing as an educational institution which it might have been slow to claim for itself.

WITHOUT the illuminating aid of Professor Charles Eliot Norton, we doubt whether one man out of a hundred thousand, or more, would ever have divined that the real reason for the founding of the Archæological Institute of America was that it might be a rebuke or a barrier "to resist the flood of vulgarity and barbaric luxury brought in by the rapid and enormous increase of wealth then beginning to overwhelm the country." In furtherance of its most laudable ambition, the Institute, as soon as founded, began to seek for texts to enforce its precepts by digging up buried cities so that "the conditions of prehistoric barbarians" might be considered. The question inevitably suggested by this unexpected explanation is: Was the luxury of the "prehistoric barbarian" any less "barbaric" than that of our own over-opulent day? We fear that the founders of the Institute must now admit that their institution is a failure so far as original intention goes, but we trust that they may find consolation in the fact that they have contributed to the world's knowledge not a little very interesting and some quite valuable information.

ALTHOUGH the Archæological Institute of America finds it none too easy to procure funds for its own particular undertakings, and though Professor Norton would hardly go so far as to call the unfortunate inhabitants of Herculaneum "prehistoric barbarians"—although they did indulge in the lavish luxury he finds so vulgarizing nowadays—we do not question but that both will be glad to lend the aid of their approbation to the romantically attractive scheme for at length exhuming that long-buried city. Professor Charles Waldstein, once Director of the American School at Athens, and now holding the chair of the Slade Professor of Fine Arts at the University of Cambridge, England, is now in this country to raise money and complete the organization of a very powerful international body of archæologists, students and rich amateurs of art, with a committee of honorary presidents consisting of Kings, Presidents and Kaisers at the head, which shall at length excavate Herculaneum and bring its buried treasures to light. Professor Waldstein knows this world at least as well as he knows that of the ancients, and that just as the ordinary Englishman "dearly loves a lord," so the thoroughly democratic American dotes on royalty and can be counted well pleased to find his name in a subscription-list headed by Edward VII. and Victor Emmanuel II.

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PROFESSOR WALDSTEIN has gathered from geologists and others satisfactory proof that the material in which this city is buried is not a true melted lava, but rather a cementitious concrete of mud, ashes and refuse raped from the mountain side, and that, though this flood covered parts of the town to the depth of eighty feet, modern excavating machines can burrow their way into it without excessive waste of time and machinery. All that is needed, now that official permission has been obtained for the undertaking from the Italian Government, is money enough to pay for the needed plant and labor. The bill, will be large, of course, but, great as the cost may be, it is probably not too great to pay for the recovery of the interesting works of art that almost indubitably can be unearthed. The marble and bronze equestrian statues recovered from the Theatre and the smaller bronze statuettes, tools and utensils, and above all the papyri recovered from the House of Piso, bear testimony not only to the artistic quality and probable number of the objects of art there buried, but also prove that the flood of liquid mud was a far more kindly preservative than the thinner covering of hot ashes that sepultured Pompeii. Now that this quest seems likely to be prosecuted with energy, we cannot help believing that it will actually be carried to a successful issue without too many delays. The remarkable verifications of history and legend accomplished in various parts of the ancient world by public and private archæological expeditions will serve as a constant spur to flagging energies and afford perennial encouragement in the face of delay and obstacle.

THE Washington correspondent of the St. Louis *Globe-Democrat* throws an amusing sidelight on the promotion of art or the art of promotion, as you will, as practised in Government circles. The story runs that last year, in a fit of economy, Secretary Shaw forbade that the report of the Supervising Architect should contain any illustrations of buildings newly designed, and was so pleased with his device that he proposed to follow the same course this year. This did not suit the Supervising Architect or the wishes of Congressmen in whose districts new buildings were to be erected, and so representations were made to the Secretary of the Treasury that a report without the usual illustrations was quite valueless; in fact, could not be given away, the proof being that about half of the previous year's unillustrated report still lay in the vaults uncalled for and undesired by even the most impassioned book-collector. As Mr. Taylor's office turns out work too good to lose, it is fortunate that Secretary Shaw saw the point, and allowed the report to revert to its accustomed form. As we ourselves put in a bid for the printing of the document, we happen to know how beggarly an economy the Secretary was aiming to effect.

THE shyster lawyer is known to make his living sometimes by working up blackmailing cases, and there are nowadays so many curious suits involving building-lines that get into the courts that one is tempted to believe that there must be engineers of the same class, who spend their time in studying deeds and taking sights with the object of now and then establishing a case of trespass which they can work to a profit. The latest of these curious cases concerns a lot of land on William Street, New York, which is in use under a hundred years' lease that still has half a century to run. Upon the lot next this property, the Royal Baking Powder Company erected a building, the upper stories of which were allowed to oversail the party-line by eight inches. The trespass was at once noticed, and the trespasser was warned, but took no heed. Then an injunction was brought, but this was dissolved and finally suit was entered. Any one indulging in law-suits has to watch the court's docket, and recently Mr. Graham, the plaintiff, while examining the docket for the day was startled at reading the announcement that his case had been "settled" and withdrawn. With the aid of his lawyer, who knew of no settlement, he at length discovered that the owner of the fee, the Dutch Reformed Church, had sold to the trespasser a strip of land eight inches wide. As the land is still subject to the tenant's fifty years' easement, the sale can not really diminish his rights, but it obviously gives the Baking Powder Company a better fighting chance, and, having plenty of money, they evidently mean to fight.

THE fact that there are established in this country a large number of architects who were born and received their architectural training in foreign countries is once more brought to mind by learning that Mr. Gordon W. Lloyd dropped dead in a restaurant last week in San Francisco, where he happened to be, on his way to Australia. Mr. Lloyd, though born in England, came to this country in boyhood but was sent back to his early home to finish his education and study the profession he was to adopt. On his return to this country in 1858 he established himself in Detroit and to the time of his death carried on there a large and successful practice.

IT is rather a shock to one's sense of the eternal fitness of things to know that, even in a quiet way, there has been in official quarters a discussion going on as to the propriety of discontinuing the Villa Medicis or rather as to the advisability of continuing that cradle of the arts where so many art students have become full fledged artists —if we may be allowed a slight jumbling of metaphors. The discontinuance of the Villa Medicis would seem to involve the abolition of the several Prix de Rome, and the discontinuance of the Prix de Rome would be to the Ecole des Beaux-Arts very like putting the axe to the roots of a vigorous, however venerable, tree. The cause of the discussion, which had final outlet in the Chamber, was the difficulty of finding a satisfactory successor as director to M. Guillaume, who had so admirably filled the place for many years. The trouble is that the Government *subvention* is not as large as it might be, only a total of thirty-five hundred dollars being applicable to the director's salary. Owing to the important position he fills, the director has to entertain all sorts of notables and and has to do it largely at his own expense; consequently only a rich man can afford to accept the honor when offered. The selection of the painter Carolus Duran fortunately solved the problem, for that artist has won a large fortune with his brush and can afford to accept the honor. Aspirants for the Grand Prix are therefore likely still to enter *en loge* for further centuries as they have ever since the days of Louis XIV.

HEATING AND VENTILATION—I.

THE subjects heating and ventilation in their different branches are usually taken up independently of the buildings to which they are to be applied. In this, and the articles following, different classes of buildings will be treated separately, and the apparatus best adapted to each will be briefly discussed, together with the methods of proportioning and arranging the different parts for the best results, both as regards ease and economy of operation.

Buildings requiring the simplest systems of heating will be taken up first, and the various pieces of apparatus described can then be applied to more complex arrangements without further description.

In designing a heating system for any building the first step is to determine the heat loss which must be made good by artificial means. The loss of heat from a building is due to the following causes: First, conduction through walls and windows; second, leakage of warm air around doors and windows and through the walls themselves; third, heat required to warm the air for ventilation. The loss of heat through the walls of a building depends upon the material used, the thickness, the number of layers and the difference between the inside and outside temperatures. The exact amount of heat lost in this way is very difficult to determine theoretically, and so we depend principally upon the results of actual experiments.

The leakage of air from a room varies from one to two or more changes per hour, depending upon the construction, the frequency of the opening of doors, etc. It is common practice to allow for one change per hour in well constructed buildings where two walls of the room have an outside exposure. As the amount of leakage depends upon the extent of exposed wall and window surface, it may be provided for by increasing the allowance for loss due to conduction.

There are several tables in use that give the heat loss through walls of different materials and thicknesses under varying temperature conditions. The following, taken from Wolfe's chart, has given good results in practice, when properly corrected for exposure, etc. The factors given in this Table are sufficiently large to cover the losses by leakage.

Material.	Difference between inside and outside temperatures. 10°	20°	30°	40°	50°	60°	70°	80°	90°	100°
8″ brick wall	5	9	13	18	22	27	31	36	40	45
12″ " "	4	7	10	13	16	20	23	26	30	33
16″ " "	3	5	8	10	13	16	19	22	24	27
20″ " "	2.8	4.5	7	9	11	14	16	18	20	23
24″ " "	2.5	4	6	8	10	12	14	16	18	20
28″ " "	2	3.5	4.5	7	9	11	13	14	16	18
32″ " "	1.5	3	5	6	8	10	11	13	15	16
Single window	12	24	36	49	60	73	85	93	105	...
Double window	8	16	24	32	40	48	56	62	70	...
Single skylight	11	21	31	42	52	63	73	84	94	...
Double skylight	7	14	20	28	35	42	48	56	62	...
Concrete on brick arch	2	4	6.5	9	11	13	15	18	20	22
Wood floor on brick arch	1.5	3	4.5	6	7	9	10	12	13	15
Double wood floor	1	2	3	4	5	6	7	8	9	10
Ordinary wooden dwellings	3	5	8	10	13	16	19	22	24	27
1″ wooden door	4	8	12	16	20	24	28	32	36	40
2″ wooden door	3	5	8	10	13	16	19	22	24	27

For sandstone, increase the factors given for brick by 1.6, and for limestone by 1.75. The figures in the table give the loss per square foot of exposed surface per hour, in British thermal units (B. T. U.).

Where rooms have an attic above or an unwarmed basement beneath, the heat loss through walls and windows should be multiplied by 1.10. The figures given in the Table are for rooms having a southern exposure; for other exposures multiply by the following factors:

Exposure.	Factor.	Exposure.	Factor.	Exposure.	Factor.
N.	1.32	W.	1.20	S. E.	1.06
E.	1.12	N. E.	1.22	S. W.	1.10
S.	1.0	N. W.	1.26	N. E. S. W. (total exposure.)	1.16

The use of the Table may be more clearly shown by applying it to a practical case:

Example.—A room 15 ft. square and 10 ft. high has two exposed walls; one toward the north and the other toward the east. There are four windows, each 3 ft. by 6 ft. in size. The two in the north wall are double, and the others single. The walls are of brick, 20 in. thick, with an inside temperature of 70 degrees. What will be the heat loss per hour when it is 10 degrees below zero?

Total surface	15 x 10 x 2 = 300
Glass surface	3 x 6 x 4 = 72
Net wall-surface	228
Difference between inside and outside temperatures	80°
Factor for 20-inch brick wall	18
Factor for single window	93
Factor for double window	62

The heat losses are as follows:

Wall	228 x 18 = 4,104
Single windows	36 x 93 = 3,348
Double windows	36 x 62 = 2,232
	9,684

As one side is toward the north and the other toward the east, the actual exposure is northeast. The factor for this exposure is 1.22; therefore, the total heat loss is $9684 \times 1.22 = 11814$ B. T. U. per hour.

DWELLING HOUSES.

The systems of heating commonly used for dwelling houses include stoves, hot-air furnaces, direct and indirect steam, and direct and indirect hot-water.

Stoves.—The simplest and cheapest form of heating is the stove. The heat is diffused by radiation and convection directly to the objects and air in the room, and no special system of transmission is required. The stove is used largely in the country and is especially adapted to the warming of small dwelling houses and isolated rooms.

Furnace Heating.—Next in cost of installation and simplicity of operation is the hot-air furnace. By this method of heating, the air is drawn over heated surfaces and then transmitted through pipes, while at a high temperature, to the rooms where heat is required. Furnaces are more costly than stoves, but have certain advantages over that form of heating. Being placed in the basement, more space is available in the rooms, and the dirt and litter connected with the care of a stove is largely done away with. They require less care, as only a single fire is necessary to warm all of the rooms in a house of ordinary size. One great advantage in this method of warming comes from the constant supply of fresh air which is required to bring the heat into the rooms. While this is greatly to be desired from a sanitary standpoint, it causes the consumption of a larger amount of fuel than would otherwise be necessary, for heat is required to warm the fresh air from out of doors up to the temperature of the rooms, in addition to that lost by leakage and conduction through walls and windows.

A more even temperature may be maintained with a furnace than by the use of stoves, owing to the greater depth and size of the fire which allows it to be more easily controlled. When a building is placed in an exposed location there is often difficulty in warming rooms on the north and west sides or upon that side toward the prevailing winds. This may be overcome to some extent by a proper location of the furnace and by the use of large pipes for conveying the hot air to those rooms that need to be favored. Furnaces may be divided into two general types known as "direct-draught" and "indirect-draught." In the direct-draught furnace the gases pass from the top of the combustion-chamber into the smoke-pipe by way of passages more or less direct. In some of the cheaper forms the gases pass directly into the smoke-pipe, thus carrying away much heat which should be utilized.

In the ordinary form of indirect-draught furnace the gases pass downward through flues to a chamber, or radiator, located near the base, thence upward through another flue to the smoke-pipe. A direct-draught damper is provided to give a direct connection with the smoke-funnel; this is to be used when coal is first put on, for carrying off the increased amount of gas which is formed at that time.

The fire-pot is usually made of heavy cast-iron or of steel plates lined with fire-brick and varies from about 12 to 18 inches in depth. Cast-iron fire-pots are more effective as heating-surfaces than lined ones, and where the latter form is used it is necessary to increase the size of the radiator or dome to offset it. The body of the furnace above the fire-pot is commonly called the dome or combustion-chamber. It should be of sufficient size to permit the gases to become thoroughly mixed with the air passing up through the fire or entering through the feed-door. The dome should be made somewhat larger than the fire-pot.

The radiator is a chamber placed either at the top or bottom of the furnace and acts as a sort of reservoir in which the gases are kept in contact with the air passing over it. Radiators are built of cast-iron, of steel plates, or of a combination of the two. Their effectiveness depends upon their form, the amount of heating-surface they offer and the difference in temperature between the gases and the surrounding air. If the radiator is placed near the bottom of the furnace it is surrounded by the coldest air and is therefore more effective; but, on the other hand, the cold air has a tendency to condense the gases and the acids thus formed are likely to corrode the iron.

The heating-surfaces of a furnace are made up as follows: The fire-pot, the dome or combustion-chamber, flues and radiators, and extended surfaces, such as ribs or pins. The ratio of heating-surface to grate-area varies somewhat according to the size of the furnace; it may be taken as ranging from 2.5 in the smaller sizes to 1.5 in the larger.

One of the first points to be determined in estimating the heating-capacity of a furnace is its efficiency—that is, the proportion

of heat in the coal that can be utilized for warming. The efficiency depends chiefly upon the area of the heating-surface as compared with the grate, on its character and arrangement, and on the rate of combustion. In practice the efficiency uusally ranges from 50 to 70 per cent. The rate of combustion required to maintain an inside temperature of 70 degrees depends upon the outside weather conditions. In zero weather this should be from 4 to 5 pounds of coal per square foot of grate per hour. In estimating the required size of a first-class furnace with a good chimney-draught, we may safely count upon a maximum combustion of 5 pounds of coal per square foot of grate per hour, and may assume that 8000 B. T. U. will be utilized for warming purposes from each pound burned. This corresponds to an efficiency of 60 per cent., which is a fair average.

Having determined the heat loss from a building by the methods given, it is a simple matter to compute the size of grate necessary to burn a sufficient quantity of coal to furnish the amount of heat required for warming.

In computing the size of a furnace it is customary to consider the whole house as a single room with four outside walls and a cold attic. The heat losses through the walls and windows are then computed and increased 10 per cent. for the cold attic and 16 per cent. for total exposure.

For wooden dwellings of the usual construction, the following simple method may be used: Multiply the total exposed surface by 38, which will give the heat loss in B. T. U. per hour for an inside temperature of 70 degrees in zero weather. This factor is obtained in the following manner: Assume the glass surface to be one-sixth of the total exposure, which is an average proportion. Then each square foot of exposed surface consists of one-sixth glass and five-sixths wall, and the heat loss for 70 degrees' difference in temperature would be as follows:

Wall	$\frac{5}{6} \times 19 = 15.8$
Glass	$\frac{1}{6} \times 85 = 14.1$
	29.9

Increasing this 10 per cent. for loss through ceilings and 16 per cent. for total exposure, we have $29.9 \times 1.10 \times 1.16 = 38.1$. The loss through floors is considered as being offset by including the kitchen walls, which are warmed by the range and would not otherwise be included, if computing the loss from each room separately.

If the heat loss is required for outside temperatures other than zero, corrections must be made as follows: Multiply by 50 for 20 degrees below zero, by 44 for 10 degrees below, and by 33 for 10 degrees above. This method is convenient for approximations in the case of dwelling houses, but the more exact method should be used for other types of buildings, and in all cases for computing the size of heat flues to separate rooms. When calculating the heat loss from isolated rooms, cold inside walls as well as the outside must be considered. The loss through a wall next to a cold attic, or other unwarmed space, may in general be taken as about two-thirds of that through an outside wall.

In calculating the size of a furnace we may consider the heat delivered to the rooms as being made up of two parts: first, that required to warm the outside air up to 70 degrees (the temperature of the rooms), and, second, the quantity which must be added to this to offset the loss by conduction through walls and windows. Air is usually delivered through the registers at a temperature of about 140 degrees with zero conditions outside, and leaves the rooms by leakage at a temperature of 70 degrees (the normal inside temperature), having lost one-half its heat by conduction, so that the heat given to the entering air must be twice that which has been computed for the loss through walls and windows by conduction.

Example.—Let us illustrate by the use of a practical example. The total heat loss from a building, as computed by the methods given, is 80000 B. T. U. per hour in zero weather. What size of furnace will be required to maintain an inside temperature of 70 degrees?

From the above we have a total amount of heat required equal to $80000 \times 2 = 160000$ B. T. U per hour. If we assume that 8000 B. T. U. are utilized per pound of coal, then $160000 \div 8000 = 20$ pounds of coal will be required per hour. If 5 pounds of coal can be burned on each square foot of grate per hour, then $20 \div 5 = 4$ square feet will be required. A fire-pot 28 inches in diameter has an area of 4.27 square feet and is the size we should use. When the outside temperature is 10 degrees below zero, multiply the computed heat loss by 2.14 instead of 2, and multiply by 2.28 for 20 degrees below and by 2.42 for 30 degrees below.

A furnace should be so placed that the warm-air pipes will be of nearly the same length. The air travels most rapidly toward the sheltered side of the house and to the upper rooms, so that the pipes leading to the north and west rooms on the first floor should be favored in regard to length and size. The furnace should, therefore, be placed somewhat to the north or west of the center of the house, or toward the points of compass from which the prevailing winds blow when the house is in an exposed location. The smoke-pipe should be carried to the chimney as directly as possible. The top of the pipe should not be less than 10 inches from unprotected beams nor less than 8 inches from beams protected by asbestos or plaster with a metal shield beneath. Town and city requirements vary somewhat in regard to this matter. A collar to make tight connection with the chimney should be riveted to the pipe about 5 inches from the end to prevent its being pushed too far into the flue. The chimney-flue should be made not less than one-seventh the grate-area of the furnace. A square flue cannot be reckoned at its full area as the corners are of little value. A clean-out door should be placed at the bottom of the flue for removing ashes and soot.

The cold-air box should be large enough to supply a volume of air sufficient to fill all the hot-air pipes at the same time. If the supply of cold air is too small, the distribution is sure to be unequal and the cellar will become overheated from lack of air to carry away the heat generated. It is common practice to make the area of the cold-air box three-fourths that of the combined area of the hot-air pipes. The inlet should be placed where the prevailing cold winds will blow into it; this is commonly the north or west side of the house.

Whatever the location of the entrance to the cold-air box, changes in the direction of the wind may take place which will bring the inlet on the wrong side. To prevent the possibility of such changes affecting the action of the furnace, the cold-air box is sometimes extended through the house and left open at both ends, with check-dampers arranged to prevent the air from blowing through. The inlets should be covered with wire netting of about ⅜-inch mesh. Adjustable shut-off dampers or slides should be placed in the inlets for throttling down the air-supply in case of high winds. A door to admit air from the cellar to the cold-air box is usually provided, but should not be used except when the house is temporarily unoccupied or during high winds. A return register placed in the front hall and connected with the cold-air box is often advisable for use in extremely cold weather, as it may be arranged to catch the cold air which rushes in when the door is opened, and also that which leaks in around it while closed. Check-valves or flaps of light gossamer or cloth should be placed between the cold-air box and the register to prevent back drafts of cold air.

The required size of the hot-air pipe to any given room depends upon the heat loss from the room and the volume of warm air required to offset this loss.

Each cubic foot of air warmed from zero to 140 degrees brings into a room 2.2 B. T. U. We have already seen that in zero weather, with the air entering the registers at 140 degrees, only one-half of the heat contained in the air is available for warming purposes, so that only 1.1 B. T. U. in each cubic foot of entering air can be utilized for this purpose. Therefore, if we divide the computed heat loss in B. T. U. by 1.1, it will give the cubic feet of air at 140 degrees necessary to warm the room in zero weather. As the outside temperature becomes colder, the quantity of heat brought in per cubic foot of air increases, but the proportion available for warming purposes becomes less at nearly the same rate, so that for all practical purposes we may use the figure 1.1 for all usual conditions. In calculating the size of pipe required, we may assume maximum velocities of 280 and 400 feet per minute for rooms on the first and second floors, respectively.

Knowing the number of cubic feet of air per minute to be supplied, we can divide it by the assumed velocity, which will give us the required area of the pipe in square feet.

Round pipes of heavy tin or galvanized-iron are used for this purpose.

The following Table will be found useful in determining the required diameters of pipe in inches:

Diameter of pipe, in inches.	Area, in square feet.	Diameter of pipe, in inches.	Area, in square feet.	Diameter of pipe, in inches.	Area, in square feet.
6	.196	10	.545	14	1.07
7	.267	11	.660	15	1.23
8	.349	12	.785	16	1.40
9	.442	13	.922		

Example.—The heat loss from a room on the second floor is 22000 B. T. U. per hour. What diameter of hot-air pipe will be required?

$22000 \div 1.1 = 20000$ = cubic feet of air required per hour; $20000 \div 60 = 333$ per minute. Assuming a velocity of 400 feet per minute, we have $333 \div 400 = .832$ square foot, which is the area of the pipe required. Referring to the table of areas, we

find this comes between a 12 and 13-inch pipe, and the larger size would probably be chosen. Since long horizontal runs of pipe increase the resistance and loss of heat, they should not, in general, be over 15 feet in length. Pipes of excessive length should be increased in size for the additional resistance.

A damper should be put in each pipe near the furnace for regulating the flow of air to the different rooms and for shutting them off entirely when desired.

While round-pipe risers give the best results, it is not always possible to provide a sufficient space for them, and flat or oval pipes are then substituted. When vertical pipes must be placed in single partitions, much better results will be obtained if the studding can be made 5 or 6 inches deep instead of 4, as is usually done. Flues should never, in any case, be made less than 3½ inches in depth. Each room should be heated by a separate pipe unless it be two unimportant rooms on an upper floor. A clear space of at least ½ inch should be left between the risers and the studs, and the latter should be carefully tinned, and the space between them on both sides covered with tin, asbestos or wire-lath. The following Table shows the capacity of oval pipes. A 6-inch pipe ovaled to 5 means that a 6-inch round pipe has been flattened out to a thickness of 5 inches, and column two gives the resulting area:

Dimension of pipe.	Area, in sq. inches.	Dimension of pipe.	Area, in sq. inches.
6 ovaled to 5	27	9 ovaled to 6	57
7 " " 3½	29	11 " " 4	58
7 " " 4	31	10 " " 6	67
7 " " 6	38	11 " " 5	67
8 " " 5	43	15 " " 3½	73
9 " " 4	45	12 " " 5	75
10 " " 3½	46	14 " " 4	76
9 " " 5	51	19 " " 4	96
12 " " 3½	55	20 " " 3½	100

Having determined the size of round pipe required, an equivalent oval pipe can be selected from the table to suit the space available for running it.

The registers which control the supply of warm air to the rooms generally have a net area equal to two-thirds of their gross area. The net area should be from 10 to 20 per cent. greater than the area of the pipe connected with it. It is common practice to use registers having the short dimension equal to, and the long dimension about one-half greater than, the diameter of the pipe. This gives the following standard sizes for different diameters of pipe:

Diameter of pipe.	Size of register.	Diameter of pipe.	Size of register.
6	6 x 10	12	12 x 17
7	7 x 10	13	14 x 20
8	8 x 12	14	14 x 22
9	9 x 14	15	15 x 22
10	10 x 15	16	16 x 24
11	11 x 16		

CHARLES L. HUBBARD.

(To be continued.)

LOSSES IN UNDERGROUND MUNICIPAL STRUCTURES.*

THE author has recently completed the uncovering of some miles of water and gas pipe and replacing the pavement, and while doing so was again forcibly impressed by the enormous loss and inconvenience caused by ordinary municipal and corporate methods of constructing and managing street surface and sub-surface structures. While this is a matter of more or less common knowledge, it is one of the most serious unsolved problems confronting municipal engineers and boards of public works, and it is probably only the apparent hopelessness of remedying present conditions which causes them to be tolerated as they are. The sources of loss are herein considered separately, but possible remedies are considered for all of them taken collectively, for the reason that it seems probable that no remedy can be found for one or two only which will be effective even for these. In fact, the attempt to treat each by itself is probably the chief reason why no acceptable results have yet been obtained by water, sewer or street boards or commissioners in preventing these wastes, and one of the objects of this paper is to call to the attention of the overseers of each class of improvement the interdependence of them all in this matter, with the hope that by co-operation a common, satisfactory solution may be found to all of the difficulties in a considerable number of cases.

Most of the losses to be referred to can be classed under four heads: 1. The destruction of street paving by constant digging up of the streets. 2. The cost of the digging itself and replacing the paving whenever the substructures must be got at. 3. The losses due to leakage of gas. 4. The loss of water by leakage. There are incidentally minor losses and inconveniences, such as the thawing of water mains and service pipes; the interference with traffic caused by excavations; difficulty of access to and ignorance of the exact location of service connections and other appurtenances; the great confusion of pipes so intricately placed beneath the streets of large cities, etc.

1. *Pavements.*—Secretary Tillson, in his work on "Street Pavement and Paving Materials," says, "It is almost impossible to repair any opening in a pavement so that it will be as good as before disturbance," and we know this to be a fact. It is not that it is not done, but that it is not practicable. The remedy does not lie entirely in being more strict with those disturbing the pavements. No pavement is now in use which can be patched without causing humps or depressions which will diminish the serviceability and hasten wear, and weak spots in the foundation, causing after settlements, are apt to be numerous. This undoubtedly results in a financial loss both in the pavement and to traffic, the former of which can best be expressed, perhaps, in terms of the shortening of the life of the pavement, but which it is difficult if not impossible to determine definitely. I believe most authorities would admit a reduction of at least 15 per cent. to 25 per cent. in the serviceable life of each section patched. The loss to vehicles might be expressed as a negative gain from the improved paving; that is, if the pavement which has been torn up and replaced is but three-fourths as much an improvement on previous conditions as if it had been left intact, then one-fourth the cost of that improvement has been lost. If the pavement were found to last four-fifths as long as if undisturbed, and meantime to have but three-fourths its full value as an improvement, then the disturbing of that pavement has caused a loss of 40 per cent. of its construction cost. The loss to vehicles may not extend over the entire surface when but one or two trenches are dug longitudinally, but the shortening of life does, since the pavement must be renewed as a whole and not by patches. (Asphalt can be patched with better success than other pavements, but ,on the other hand, the patching generally costs more.) I believe 30 per cent. of the cost of city pavements would be a conservative estimate of the loss due to disturbing them—50 to 75 cents a square yard, or, say $2 to $4 a lineal foot. If this loss be distributed over the life of the pavement, and this be assumed at sixteen years (on the basis of twenty years of life if undisturbed) we have 12.5 to 25 cents per year per foot as this loss.

As to the amount of such disturbance. In New York, in 1896, one mile in four was torn up for construction purposes, and one opening requiring repairs for every 40 feet of paved street. In Brooklyn, during the same year, one opening was made for every 75 feet of paved street. In Boston, in 1897, in about 500 miles of paved streets there were 14,017 separate openings, about one to every 185 feet, with a total length of openings of 2,134 miles. In Chicago, in 1902, 20,200 permits were granted to tear up pavements, resulting in about 200,000 square yards of disturbance, or one opening to each 340 feet of street. Records of smaller cities are difficult to obtain, but with the spread of wire conduits and steam heating to small cities and towns (which already have sewers, waterworks and gas), all agree the destruction of pavements is increasing rather than decreasing.

2. *Cost of Digging.*—This, of course, depends largely upon the size of hole necessary, but probably no opening costs less than $3 to $5 plus the cost of replacing the paving. This last will cost, if properly done, about as much as the original paving, even when most of the material can be used again—say, at least $1.50 per square yard for all pavements on a concrete base and 50 cents for macadam. In Washington, D. C., the cost of taking up and replacing the paving for street openings during one year on about 125 miles of streets (110 of which were asphalt and ten asphalt-block) was $47,594.83, or $380 per mile, or 7.25 cents per foot.

Assuming one opening, costing $4 for excavating and back-filling for each 100 feet of street, gives 4 cents per foot for this. Probably 8 to 15 cents a lineal foot of the entire street surface would not be an excessive estimate of the cost of excavating where the pavement is properly returned.

3. *Gas Mains.*—It has been estimated that "in good practice the normal leakage of gas mains is 225,000 cubic feet per mile per annum for an average diameter of 6 inches. It is frequently twice that amount; in some instances it is three or four times greater. In American practice leakage ranges from 10 to 30 per cent. of the output." (Jas. C. Bayles, League of American Municipalities, 1902.) In 1898, 353 plants reported to the United States Commissioner of Labor a leakage of 7.3 per cent. to 14.7 per cent., 163 of these more than 14 per cent. and all but 26 more

*A paper read before the American Society of Municipal Improvements by Prof. A. Prescott Folwell.

than 11 per cent. If we assume that gas costs an average of 40 cents in the mains, and a leakage of 200,000 cubic feet per mile per year, this gives a loss of $80 per year per mile of main, or 1.5 cents per foot. Unfortunately the greatest loss due to leakage of gas does not always fall upon the gas company, but is found in the destruction of asphalt pavements above such leaks; in many fires of "unknown origin," but attributed by insurance companies to gas leaking into cellars and basements from the ground (the freest outlet when street surfaces are sealed with concrete); in explosions and asphyxiation of workmen in sewers, a large part of the "sewer gas" to which this is attributed being generally illuminating gas; and in the illness of individuals and shade trees.

4. *Water Mains.*—Much has been written about waste of water by consumers; not so much about loss from the underground mains and service connections. Mr. Dexter Brackett reported to the Metropolitan Water Board (Boston and vicinity) in 1904 that "the tests which have been made in the several municipalities of the metropolitan district tend to show that the leakage from the street mains and services is very large, and that from 10,000 to 15,000 gallons per mile of street main escape each day into the ground or into some underground channel." In one town of this district 24,000 gallons per day was found to leak from 1,000 feet of main—a rate of 130,000 gallons per mile. Different authorities consider that an average of from 500 to 3,000 gallons of water leak from each mile of well-laid main daily. Taking the average of poorly laid and well laid, probably 5,000 gallons is well under the actual amount in the average plant. At 5 cents per 1,000 gallons at the average cost of putting water into the mains, this means a loss of $91 per year per mile of pipe, or 1.7 cents per foot.

For the sake of brevity few data have been introduced to substantiate the above statements and assumptions, but they are all based upon reliable reports and investigations, and probably any member of this Society could find in his own city indications, if not proofs, that they are conservative.

These four losses, as estimated above, total 22.5 to 45 cents per lineal foot of street per year. This is, of course, a general average, and some cities may be so fortunate as to suffer much less loss. But the author believes there are more in which these figures are exceeded in the business sections. There are the additional considerations of the annoyance from tearing up of streets and from odors of gas, and objections to water waste other than financial ones and others previously mentioned.

The correction of each of these objectionable conditions without a radical change of the entire system of underground structures has probably progressed nearly as far as is practicable; but with more care joints of sewer, water and gas pipes and the house services of each (in which much if not most of the leakage frequently is found) can be improved upon. For instance, a small box might be placed over every corporation cock and goosenecks always used; tarred pipe could be rigidly excluded from gas mains (the author has seen a great many tarred specials used in these). Also service connections could be run to the curb opposite every building lot from sewer, gas, water and heat mains just previous to repaving and at no other time. But there would still remain the tearing up of streets for laying new mains, for repairing leaks, thawing frozen pipes, etc.

The most serious loss, that in connection with the paving, can be somewhat lessened by having all tearing up, back-filling and repaving done by the city at a fixed price which the corporations desiring the excavation should pay. It would not then be necessary to bring pressure upon and await the delays of the corporations responsible for remedying the faulty relaying of a pavement, but all paving and repairs would be under the immediate supervision of and attended to directly by one city department. This is probably the best solution of an undesirable state of affairs, and has been adopted by several cities. But even this does not give perfect repaving, since such is practically impossible, nor do away with the annoyance and cost.

The only solution which can be adopted as satisfactory will be one in which the paving will never need to be torn up until worn out, in which all pipes, wires, etc., can be laid without interfering with the paving and be readily inspected at any time, this being true of service pipes and wires as well as mains. The paving can be preserved by not permitting either private corporations or city departments to lay any mains under the streets, but compel them to purchase right-of-way along private property, or else reserve strips of public property—such as alleys or strips between the sidewalk and the street (the latter of which would be interfered with by shade trees)—under which all such would be laid. But the other disadvantages are not remedied in this way. To meet them all a general conduit seems to be the only solution, with small branch conduits for the service lines. It seems probable that the model city of the future will have such conduits throughout its business section at least, where pavements are most expensive and such structures most numerous. In them would be placed the small sewers of the separate system, water, gas and steam-heating mains, while in the walls of hollow tile could be run the telegraph, telephone and other wires. St. Paul already has something similar to this in its sandstone sewer tunnels, as has Paris in its sewers. Nottingham and St. Helens, England, comparatively small cities, have had such conduits for several years. In Chicago 60 miles of tunnels for wires have been built, the trunk tunnels 12 2-3 by 14 feet, the branches 6.5 by 7 feet. If a private company can do this for its own wires only, it would seem to be still more practicable financially when all the above can be provided for. The advantage of such a conduit is not confined to the annual savings if the structures it contains can be originally laid in it, thus saving the excavating and repaving which would otherwise be necessary. This would amount to not less than 75 cents a foot for each structure, or $3 a foot for four—as sewer, water, gas and steam. (In the centers of the larger cities the number of various pipes, etc., would be several times this.) An electrical conduit in a business section costs $2 to $4 a foot or more (26 cents per duct foot on an average). ,Therefore, even in a city of small size—say 25,000 to 60,000—the saving of $5 to $10 on construction would be effected. The loss of 22.5 to 45 cents per foot capitalized at 4 per cent. would give $5.56 to $11.25 per foot, or a total of say $10.50 to $21 per foot. The conduit offers other advantages besides these financial ones, such as facility of inspection of all pipes, etc., and exact knowledge of the location and condition of each service connection. Also freedom from freezing of water mains and ease of thawing if frozen.

The weak point in this argument, and probably one of the principal reasons why more cities have not built these conduits, is that before they are really necessary several of the pipes have already been laid in different parts of the street, and instead of saving much of the cost of laying, the use of the conduit requires the relaying of all of them, or of all but one, around which one the conduit may be built. But in spite of this it would seem as though some such a contrivance is a necessity if we are to construct and maintain good paving, and that the time is coming when any city can afford a brick, asphalt or modern wood-block pavement must afford to first place under it a conduit which will preserve it from premature disfigurement, deterioration and renewal.

THE SORBONNE.

FIRST of all, the Sorbonne is a building, one of the most successful—and most unsuccessful—attempts of modern architecture to supply the demands of a great modern university. It is one of the many buildings of the present University of Paris, and it is the seat of the most important organism of the centralizing, State-monopolizing, all-embracing University of France. By the way, it occupies the site and wears the name of an historic building which was the center of the old University of Paris from the thirteenth century to the Revolution; and the old seventeenth-century church remains built into the modern structure and still contains the tomb of Richelieu, second founder of the Sorbonne.

The new building is a construction of the republic. The Empress Eugénie indeed laid a corner-stone in 1855; but nothing was done, the plan was abandoned, even the corner-stone was lost. So everything had to be begun over again; and the first operation was a great competition of plans for the choice of an architect. M. Nénot, a "Grand Prix de Rome," came out ahead, a young man of twenty-nine. This was in 1882, and for twenty-two years he has been realizing his plans in stone, carved architecturally without and painted murally within, with arched vestibules and a giant stairway and cloistered passages round interior courts, giving hundreds of lecture-rooms, which are sometimes well fitted to their purpose, and too many dark corners reserved for laboratories. But the show rooms, the great halls of pomp and parade, are beyond all praise.

The front of the building, on the side of its official entrance, extends 274 feet along the Rue des Ecoles, one of the broad avenues cut ruthlessly by Baron Haussmann through the century-old grime of the crowded, tumble-down Latin Quarter. Then, in an irregular oblong of from 700 to more than 800 feet, the build-

ing climbs the hill along the Rue Saint-Jacques, which was a Roman road on one side and old streets with modern names on the other. There it is on a level with the transmogrified Collège Sainte-Barbe, which in the mediæval university had Ignatius of Loyola and John Calvin for its students, the present flourishing Law Faculty, and beyond with the Panthéon. Across the Rue Saint-Jacques, lower down, is the Collège de France, the venerable seat of a higher university extension imagined by Francis the First. Below is the Musée de Cluny—an abbot's house built around Roman baths where Emperor Julian was sweated, even if he was not crowned there, as legend has it. And on every side university buildings dot this genuine Latin Quarter—where Latin is talked or thought, and which is not to be confounded, as Americans in and out of Paris do, with the art students' Bohemia. Altogether, the surroundings are all that could be desired for an historic Studium Generale, which is here and now a beehive humming with young thought and old doctrine.

Tourists commonly visit the Sorbonne to see the mural paintings—at the head of the great stairway, the Fasti of Paris Letters by Flameng and of Science by Chartran; in the amphitheatre, the long hemicycle of Puvis de Chavannes, "Sacred Wood." But if the janitress is properly tipped and there is nothing going on, you may be introduced into vast halls glorious and golden in decoration; the Salle du Conseil Académique, with its panels painted by Benjamin-Constant; the great reception-hall, decorated by Cazin; the rector's dining-room, by Raphael Collin, the rector's own reception-room, by Olivier Merson, and other salons and halls for university committees and doctors' parade disputations, by other contemporary French artists, proud to do their best work for one of the chief monuments of new Paris. The taste for sculpture is not so commonly found among visiting tourists, but here and there and everywhere are planted decoratively statues of university glories, as far back as Homer for letters and Archimedes for science (by Falguière).

This one building, now fairly complete, except in details, serves first for the two faculties of letters and sciences of the University of Paris. It includes none of the professional scientific schools; but it furnishes a place for the Ecole Pratique des Hautes Etudes—a special school for the supraliminal highest courses of all—and for the celebrated Ecole Nationale des Chartes, where archivists, librarians and archæologues who have to do with documents may learn to read and weigh the parchments of a thousand years equally with the browning papers of the Revolutionary tribunals and the sources of contemporary French history.—S. D. in *New York Evening Post.*

BOOKS AND PAPERS

MR. McGOODWIN'S book* is handsome and attractive, conspicuously so, and is a credit alike to writer and publishers. But it has nevertheless a modest purpose. It does not propose to go any farther in illuminating the obscurities of *Shades and Shadows* than is necessary to make clear the processes commonly employed in the solution of some common problems. In pursuit of this eminently practical end the plates are numerous, some of the earlier ones are quite simple, and all of them, instead of being mere geometrical diagrams, mechanically engraved, are *fac-similes* of actual drawings made with pencil, pen and brush. The book thus teaches by example as well as by precept. The accompanying text is brief and is pertinent to the special cases in hand, and it contains, incidentally, much useful information and good advice in regard to the use of brush, pen and pencil, thus enforcing example by precept.

Besides these plates, which are seventy in number, there is, for a frontispiece, an interesting and instructive one showing a line-drawing, a rendered drawing, and a photograph, all of the same building. In this, by an unlucky slip, Mr. Hunt is named after his son. There are also, at the end of the book, half a score of plates of the Orders, with their shades and shadows, photographed from plaster casts, a unique and admirable feature.

The technical terms are few, simple and well chosen, and the notation consistent and not difficult to master. Still, the book is not easy reading, and only experience over the drawing-board and in the class-room can show whether, as may be feared, some of the examples given are a little complicated for the purpose, and the explanations a little concise. The processes would probably be easier to follow if the construction-lines had been *dotted in*, as is usual in text-books. But then the plates would have been less like real work. They would also have been more attractive, as well as more informing, if the portion of the surfaces which is in shade had been discriminated from that in shadow by a lighter tint, a distinction which, especially in drawings made to a small scale, as most rendered drawings are, adds greatly to their luminousness and to the transparency of the shadows. But there is, throughout the book, but little recognition of the phenomena of reflected light, either in the drawings or in the photographs.

Another thing which makes the drawings difficult to follow is the frequent use of a side elevation, instead of a plan, to give the third dimension, and the adoption of the draughtsman's device of economizing space and labor by drawing the plan, or side elevation, directly upon the main elevation, instead of below, or alongside. In fact the methods that are best for the draughtsman do not seem to be in all respects best suited to the needs of the teacher or of the student.

An admirable feature in this book is the repetition of a plate whenever the text which relates to it overruns the page opposite to it. Future writers please copy.

Carefully constructed shadows are, as Mr. McGoodwin justly says, an essential element in accurate draughtsmanship; if judiciously rendered they add greatly to the attractiveness of a drawing; and in geometrical elevations, which give only height and width, they are of practical service, as indicating the third dimension. But he goes on to claim that shadows are an important element not only in the composition of the picture, but in the architectural composition of the building itself, and that an architect, like a painter, should, in studying his design, directly aim at effects of chiaroscuro. This seems to us somewhat dangerous counsel, especially in view of the inevitable tendency, in drawing-board designing, to consider the rendered drawing as a final result of one's endeavors, instead of looking ahead to the actual conditions of the actual structure. Shadows are indeed a main element in the pictorial aspect of buildings, and this is necessarily the way of regarding them which is fostered by drawings and photographs. But this aspect varies, of course, greatly, according to the weather and the time of day. It can be commanded by the draughtsman in his sketches and renderings, and by the patient painter of landscape in search of the picturesque. But it is not to be counted on for the man in the street, in daily life, out of doors. Architecture, like sculpture, is a matter of solid forms. It exists in the round. It has to do with the real relations of real things, not with contrasts of lights and shades, blacks and whites, and the special charm which buildings and statues take on, when seen under special conditions of favorable illumination, has only an accidental and adventitious merit—like that given by searchlights to the Niagara whirlpool, or by the setting sun to the Cathedral front at Orvieto. We conceive that a building is best apprehended, in truth and soberness, on a gray day, and that its purely architectural qualities are then best manifested.

If this is so, it is a fair question whether the pictorial effects which make rendered drawings so attractive are not actually misleading, as well as quite irrelevant to the practical business in hand. One is here reminded of the sage remark of the eminent practitioner who said he could never trust his designs until the office-boy's copies of them looked well. It would seem, at any rate, as if the employment of shade without shadow, as in drawings made by diffused light, a treatment to which Mr. McGoodwin naturally does not refer, had some advantages over the accepted method. Though such drawings are less attractive they are not less veracious; they give the third dimension nearly as well, and for small objects much better; and they are free from the geometrical pitfalls which, even with Mr. McGoodwin's careful guidance, must always be a terror to the architectural draughtsman.

**Architectural Shades and Shadows*, by Henry McGoodwin, instructor in architecture in the University of Pennsylvania. Published by the Bates & Guild Company, Boston, Mass. Price, $3.

ILLUSTRATIONS

ELEVATIONS OF OFFICE BUILDING FOR THE BUSH COMPANY, LIMITED, BRIDGE, PEARL AND BROAD STREETS, NEW YORK, N. Y.
MESSRS. KIRBY, PETIT & GREEN, ARCHITECTS, NEW YORK, N. Y.

In these times when no architect seems to feel he is "doing" anything unless he has the fortune, good or bad, to have entrusted

to his skill the erection of a modern steel-skeleton "high building," it is distinctly refreshing to come upon some one who is willing to devote skill and study to the creation of so successful a low building as this. We do not know whether to congratulate the more sincerely the architects who were brought into contact with so amenable a client, or the client for having entrusted his fate to designers of such proved competence.

PLANS AND SECTIONS OF THE SAME.

GENERAL EXTERIOR DETAILS OF THE SAME.

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CENTRAL DOORWAY: CHURCH OF ST. BARTHOLOMEW, MADISON AVENUE AND 44TH STREET, NEW YORK, N. Y. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, AND MESSRS. DANIEL C. FRENCH AND ANDREW O'CONNOR, SCULPTORS, NEW YORK, N. Y.

One of the pieces of decorated architecture in New York best worthy of attentive study is the frontispiece, as it were, which has been plastered across the lower story of St. Bartholomew's Church, which was built, a number of years ago, after the designs, of Messrs. Renwick, Aspinwall & Russell. The new and elaborate treatment of the doorways, which forms a memorial to the late Cornelius Vanderbilt, provided by members of his family, accords none too well with the treatment and material of the original structure, which is Lombardic in style and variegated in color; but it is so important in itself, so self-contained and so satisfying, that it can easily be, and always will be, considered as an entity, without reference to the building of which it now forms so all-important an adjunct.

DETAILS OF THE NORTH DOORWAY OF THE SAME CHURCH. MR. PHILIP MARTINY, SCULPTOR.

It should be noted that the large frieze at the left was modeled by Mr. Andrew O'Connor.

"BLITHEWOOD": HOUSE OF CAPTAIN A. C. ZABRISKIE, BARRYTOWN, N. Y. MESSRS. HOPPIN & KOEN, ARCHITECTS, NEW YORK, N. Y.

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NOTES AND CLIPPINGS

THE BERLIN HEIGHT-LIMIT UNALTERED.—Another attempt to get permission to build skyscrapers in Berlin has failed. The law permits no building to exceed twenty-two metres in height.—*Exchange.*

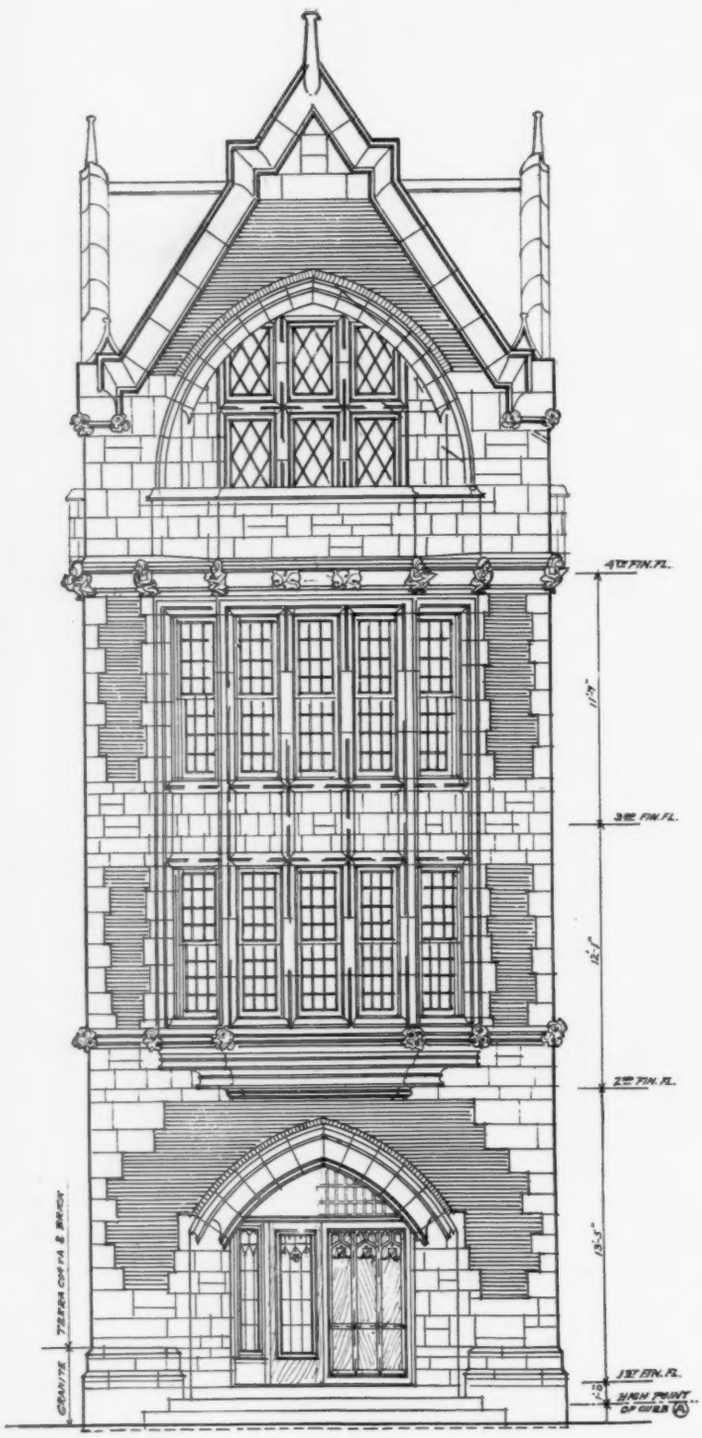
THE CHATEAU DE BAGATELLE, PARIS.—The little château of Bagatelle, adjoining the Bois de Boulogne outside of Paris, which was built in 1779 by the Comte d'Artois, and was used during the Revolution as a restaurant, has been bought by the city of Paris for $1,300,000, and will be made part of the Bois de Boulogne park. It was owned by an Englishman, Sir Murray Scott, who was offered a much larger sum by speculators wishing to cut the property up into building-lots.—*New York Evening Post.*

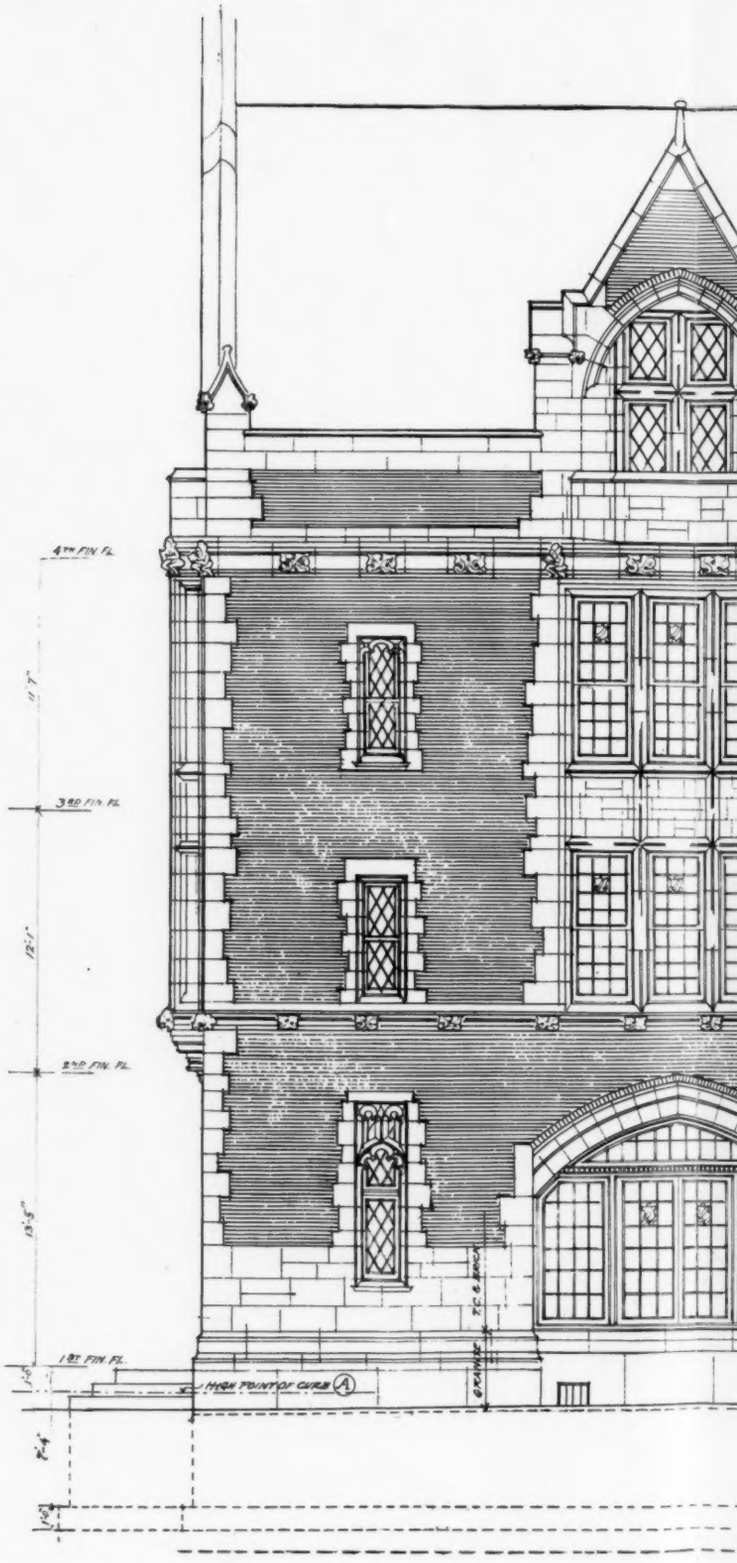
HOW LOS ANGELES PROMOTES MUNICIPAL IMPROVEMENTS.—The city of Los Angeles, California, has just adopted a unique method of handling the telegraph-pole nuisance in the residence section. The business portion of that city having been pretty well cleaned up, it was decided after much discussion that two miles of street should be brought into conduit each year in the residence district. As Los Angeles has no alleys, and as there are two telephone companies supplying one instrument to every six inhabitants, the largest ratio of any city in the Union, the pest of poles and wires had become almost unbearable. The City Council, however, refused to agree to the two-mile per year conduit addition, unless it were embodied in a plan whereby the selection of the area could be made on some basis that would not be open to the charge of favoritism. To select some particular two miles of street for this advantage, when the whole city was clamoring for it, would involve difficulties the authorities were not willing to face. The arrangement finally effected provides for the filing of petitions by improvement associations representing the various streets contending for the favor, in which they set forth what improvements they are willing to make if the conduit privilege is granted; and the streets or regions with the best showing win. Two of the best resident streets of the city have entered the contest, offering to carry out a whole series of improvements, which would make them over into handsome boulevards, if their poles and wires are removed. This plan has been passed upon by many of the best civic authorities in the country and declared to be doubly effective; for it not only disposes of a nuisance but turns it to actual advantage in bringing about improvements.—*Municipal Journal and Engineer.*

AXEL HAIG'S ETCHINGS.—When Whistler was shown by the writer some of Mr. Haig's illustrations in *The Architect* he expressed surprise that so able a draughtsman did not produce etchings instead of lithographs. Mr. Haig took up etching, and with what success all lovers of art must know. A more remarkable exhibition of architectural views [recently opened in the Fine Art Society's rooms in Bond street] has never been seen in London. No plates or drawings are better adapted to popularize the art than Mr. Haig's. His etchings will hold their own for effect beside plates of another kind by various masters. It has been objected to them that they are over-elaborated. If etching is to be taken as the expression of a momentary emotion before a building, then of course detail is out of place. What different people observe when they look upon a cathedral probably varies according to the sensitiveness of the individuals. All who have a genuine achitectural spirit which qualifies them to become artists are struck by the irresistible power of the impression which such a building makes. When Mr. Bodley said that York Minster filled him with awe as a child, and that "it seemed like a great cliff wrought over with beauty and stamped with dignity," he was recording the experience of many another architect. To eyes like Mr. Haig's, which have been trained by practice of the severest kind—for he long worked for architects—much more is visible even at the first glance than is likely to appear to an ordinary observer. In Gothic buildings there is not only mass but detail, and Mr. Haig would belittle his architectural practice if he ignored those characteristics and represented a cathedral as if it were a simple structure which could be adequately suggested by a few lines. Those who are satisfied with simple studies will find in the pencil drawings exhibited evidence that Mr. Haig can be also expressive while employing only a very limited number of lines. Whatever he does is adapted to its purpose, and students of architecture will find a study of the drawings and etchings profitable to them.—*The Architect.*

KING LEOPOLD'S COLLECTION OF PAGODAS.—Among the many queer idiosyncrasies of King Leopold there is none that is more peculiar than his hobby for pagodas, which amounts almost to a mania. In fact, I believe that if he had his way he would live in a pagoda. Pagodas figure largely among the bric-à-brac of his palaces at Laeken and at Brussels, especially in his private apartments. There are pagodas of porcelain, ivory, ebony, of silver, and indeed of every conceivable material, while some years ago I recalled his keeping people employed for several months in hunting through all the curio shops of Paris and of other European capitals to find for him some Oriental bronzes in the shape of pagodas perched on the backs of elephants, and upon which he had set his heart. They were ultimately found with great difficulty in a second-hand shop in Paris. But the King was delighted, and they figure among his treasured possessions. If I mention this it is because he has just completed, at a cost of close upon $500,000, the construction of a species of pagoda in the grounds of his suburban palace at Laeken. It stands in the park near Jean de Bologna's fountain of Neptune, and rises to the height of nearly one hundred and fifty feet above the pedestal. There are about eight or ten stories to the pagoda, all the windows are of stained glass, and when at night it is lighted up by thousands of small electric globes the effect is most fairylike. The interior is decorated on a scale of extraordinary magnificence. Both China and Japan have been ransacked for the costly wooden carvings and superb lacquer panels, while the furniture is of carved ebony, inlaid with ivory, mother-of-pearl and silver. Close by is a Chinese restaurant, from which all the meals are served to the King when he is resting in his pagoda. But since it has been completed no visitors or strangers, not even court officials or members of the royal family, have been admitted, sentinels and gendarmes having been stationed all around, with the most peremptory orders from the King to prevent any one having access to the pagoda without his permission in writing.—*Marquise de Fontenoy in New York Tribune.*

[*For* SOCIETY NOTES *see pp. VI.-VII., and for* BUILDING NEWS *see p. IX.*]





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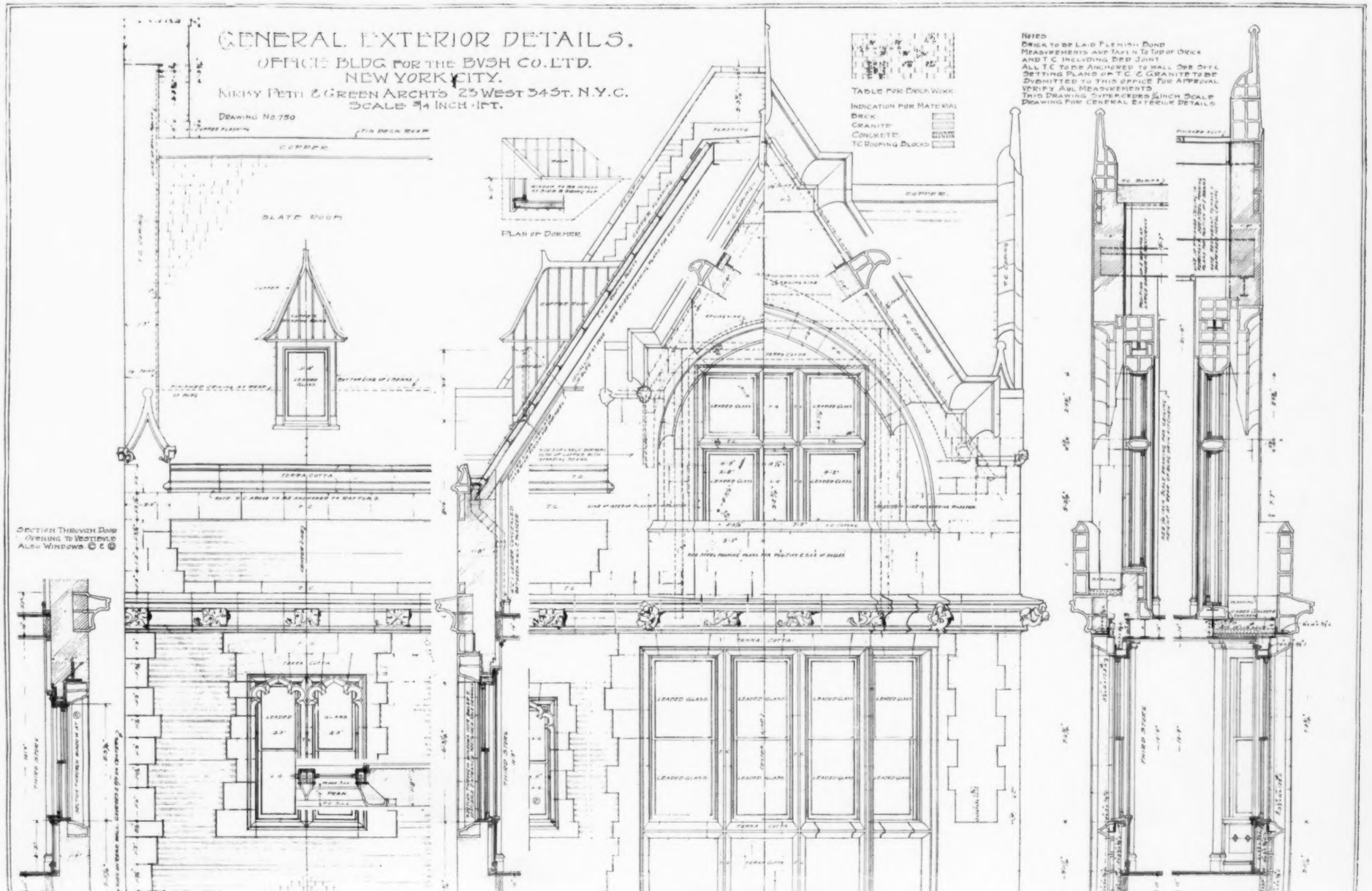
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ALL T.C. TO BE ANCHORED TO WALL SEE DETL
SETTING PLANS OF T.C. & GRANITE TO BE SUBMITTED TO THIS OFFICE FOR APPROVAL
VERIFY ALL MEASUREMENTS
THIS DRAWING SUPERCEDES 1/4 INCH SCALE DRAWING FOR GENERAL EXTERIOR DETAILS
COPPER
TIN DECK ROOF
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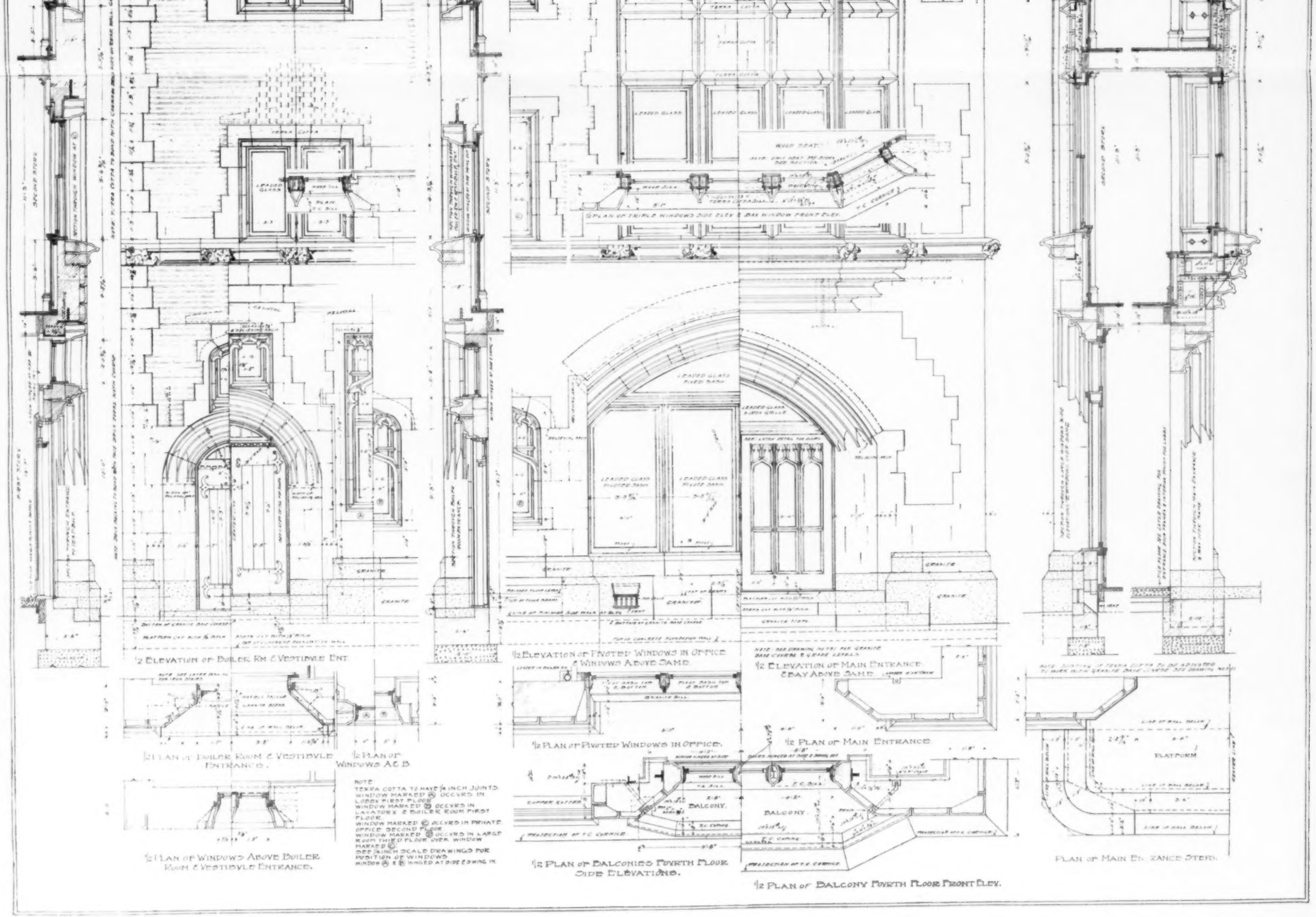
PLAN OF DORMER
TERRA COTTA
LEADED GLASS
SECTION THROUGH DOOR OPENING TO VESTIBULE ALSO WINDOWS B C D


½ Elevation of Boiler Rm & Vestibule Ent.
½ Plan of Boiler Room & Vestibule Entrance.
½ Plan of Windows A & B
½ Plan of Windows Above Boiler Room & Vestibule Entrance.
NOTE
TERRA COTTA TO HAVE ⅛ INCH JOINTS
WINDOW MARKED (A) OCCURS IN LOBBY FIRST FLOOR
WINDOW MARKED (B) OCCURS IN LAVATORY & BOILER ROOM FIRST FLOOR
WINDOW MARKED (C) OCCURS IN PRIVATE OFFICE SECOND FLOOR
WINDOW MARKED (D) OCCURS IN LARGE ROOM THIRD FLOOR OVER WINDOW MARKED (C)
SEE ¼ INCH SCALE DRAWINGS FOR POSITION OF WINDOWS
WINDOW (A & B) HINGED AT SIDE SWING IN
½ Elevation of Pivoted Windows in Office & Windows Above Same.
½ Plan of Pivoted Windows in Office.
½ Plan of Balconies Fourth Floor Side Elevations.
½ Elevation of Main Entrance & Bay Above Same
½ Plan of Main Entrance.
½ Plan of Balcony Fourth Floor Front Elev.
Plan of Main Entrance Steps

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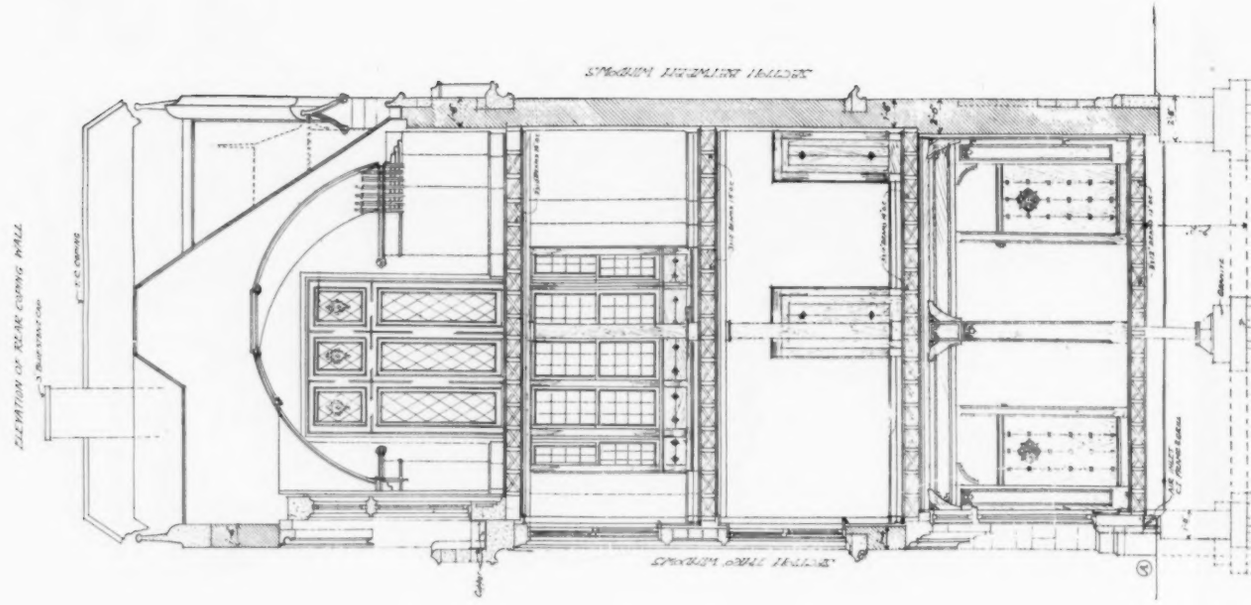
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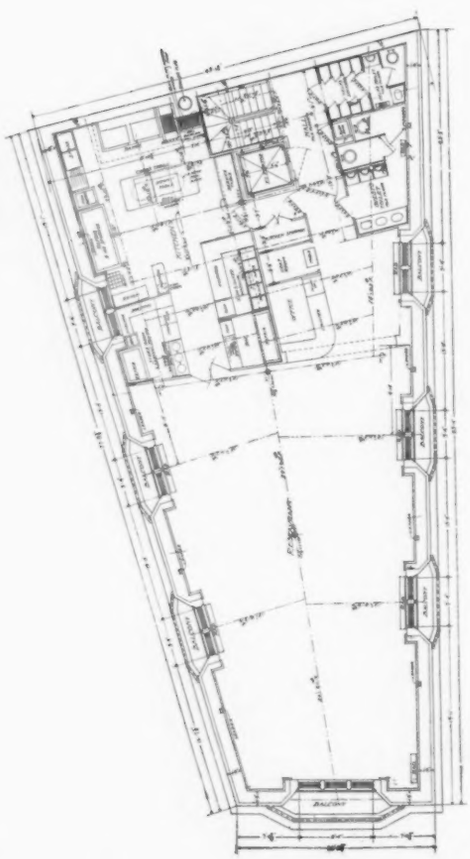

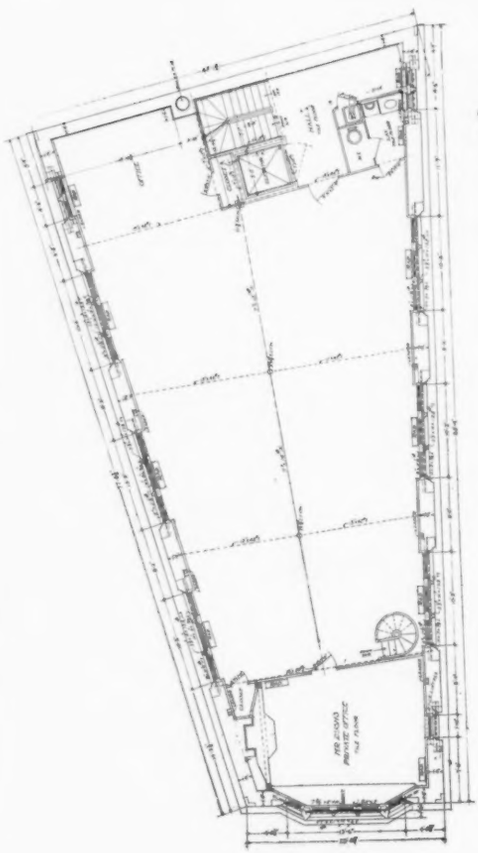

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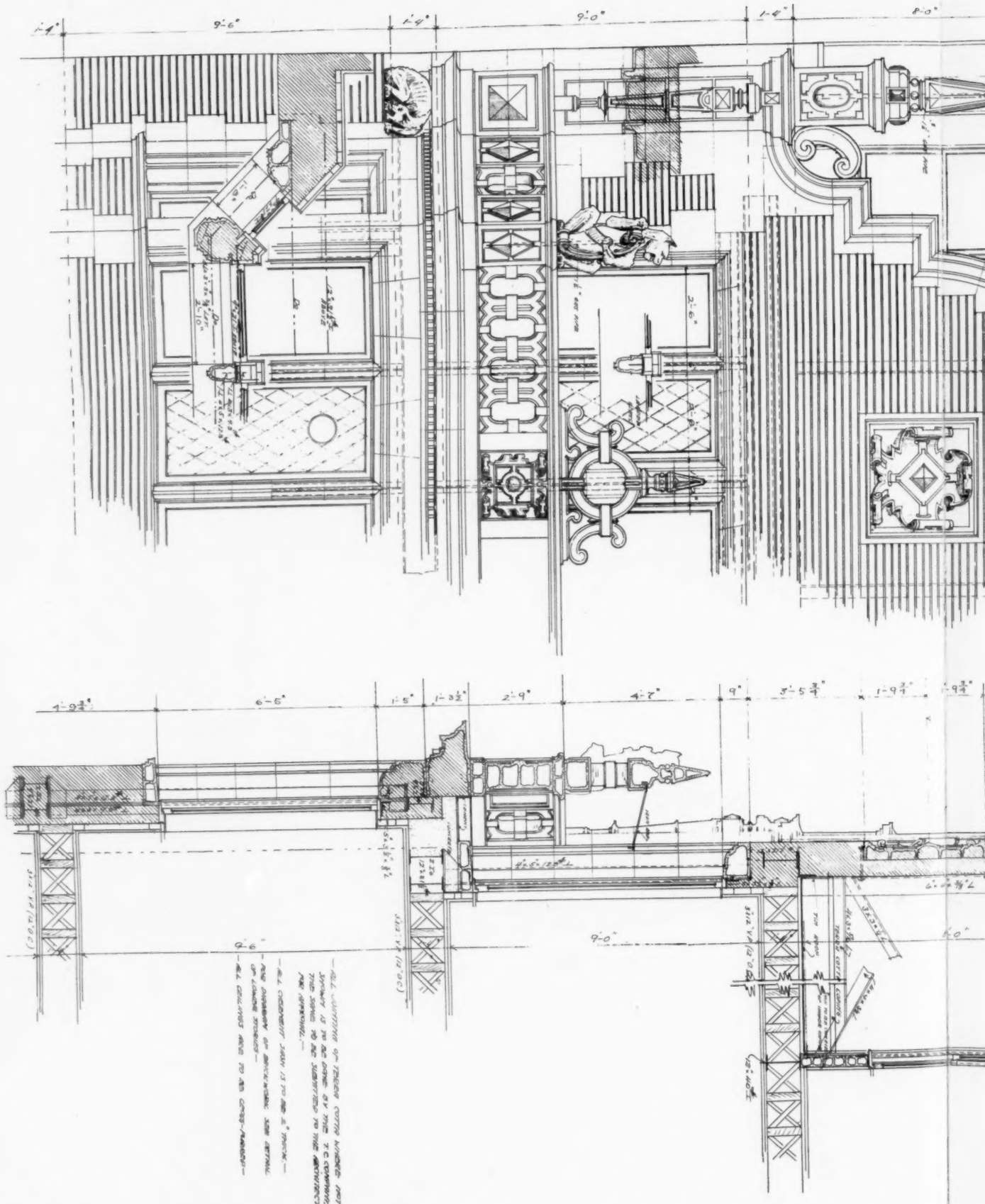

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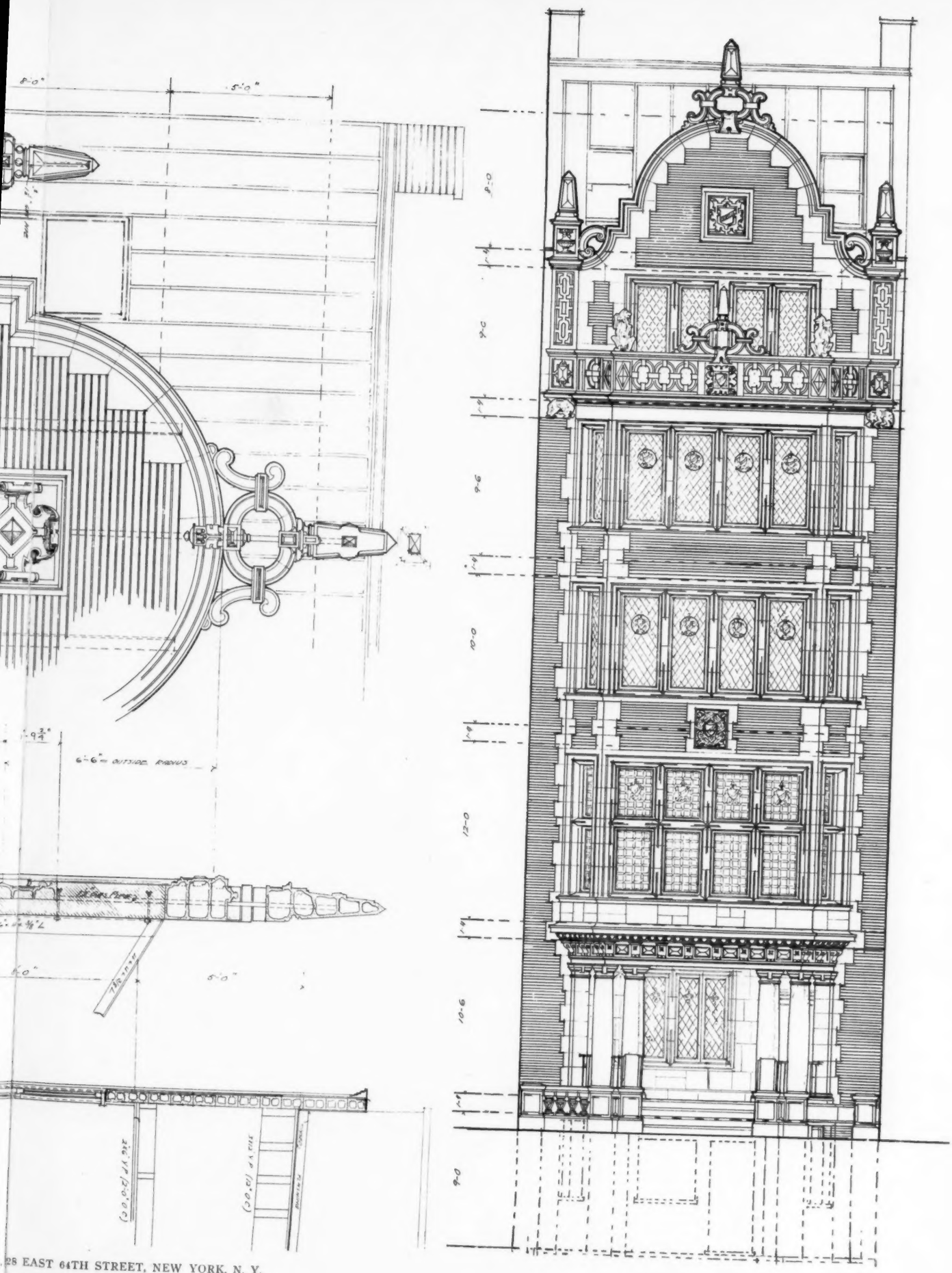

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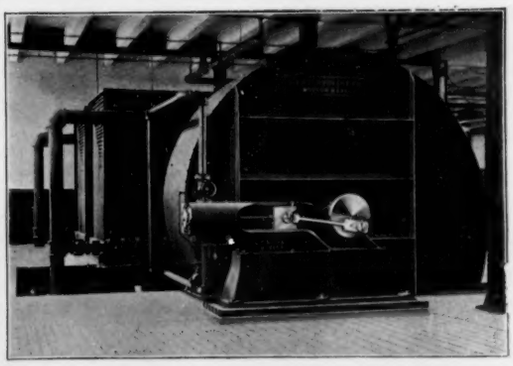

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Treasury Department, Office of the Supervising Architect, December, 28th, 1904, Washington, D. C.—Sealed proposals will be received at this office until 3 o'clock P. M., on the 21st day of February, 1905, and then opened, for the construction complete, of the U. S. Post Office at Westchester, Pennsylvania, in accordance with drawings and specifications, copies of which may be had at this office, or at the office of the Postmaster at Westchester, Pennsylvania, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. (1515)

Treasury Department, Office of the Supervising Architect, Washington, D. C., Dec. 24, 1904. —Sealed proposals will be received at this office until 3 o'clock P. M. on the 9th day of February, 1905, and then opened, for the construction complete of U.S. Post Office at Nevada, Missouri, in accordance with the drawings and specification, copies of which may be had at this office or at the office of the Postmaster at Nevada, Mo., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. (1515)

Treasury Department, Office of the Supervising Architect, Washington, D. C., December 30, 1904.—Sealed proposals will be received at this office until 3 o'clock P. M. on the 9th day of February, 1905, and then opened, for the construction complete of the U. S. Post Office at Natchez, Miss., in accordance with drawings and specifications, copies of which may be had at this office or at the office of the Postmaster at Natchez, Miss., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1516

BUILDING NEWS.

(The editors greatly desire to receive information from the smaller and outlying towns as well as from the larger cities.)

ANNVILLE, KY.—The trustees of Lebanon Valley College have decided to raise $85,000 by subscription, which, in addition to the $40,000 insurance, will be used to erect four college buildings to replace the structures recently destroyed by fire. About $3,500 has already been pledged. The plan is to rebuild the college in time for the opening of the college year in 1906. The new buildings will include an administration building, a hall of science, a boys' dormitory and a central heating and lighting plant.

AKRON, O.—J. Milton Dyer, Cuyahoga Building, Cleveland, has drawn plans for the $250,000 court-house for Summit County.

ALLEGHENY, PA.—C. C. Badgley, of Fairmont, W. Va., has been selected to draw plans for a $100,000 hospital building to be built at Sherman and Montgomery Aves., for the Presbyterian Hospital.

BRANFORD, CONN.—Plans for rebuilding the edifice of St. Mary's Roman Catholic congregation have been prepared by Architect J. J. Dwyer, of Hartford. Cost will be about $125,000.

BOSTON, MASS.—H. M. Hartshorn has leased for a term of 50 years the property owned by the estate of Sarah E. Slocum, at 23-29 Lagrange St. and 8 Boylston Sq. Mr. Hartshorn will immediately develop the property by the erection of a modern fireproof hotel, plans for which are now being prepared by Arthur H. Bowditch and E. B. Stratton. The ground floor of the Lagrange St. portion of the building will be occupied by offices and public rooms and the upper portion by guest rooms, with bath connecting each room. The Boylston Sq. part of the building will contain a large à la carte café on the first floor and there will be a unique two-story table d'hote dining room and banquet rooms above.

BUFFALO, N. Y.—At a recent meeting of the Union Station Commission, an offer was submitted by the 13 railroads entering the city to build a union station, at a cost of $15,000,000. A complete alteration of the freight and passenger terminals is proposed by the railroads. The matter was submitted to Mayor Knight.

CHATTANOOGA, TENN.—The D. B. Loveman Company will erect a $50,000 addition to its store building.

CHATTANOOGA, TENN.—Plans have been drawn by W. T. Downing for apartment house to be erected by J. I. Lupton, 511 East

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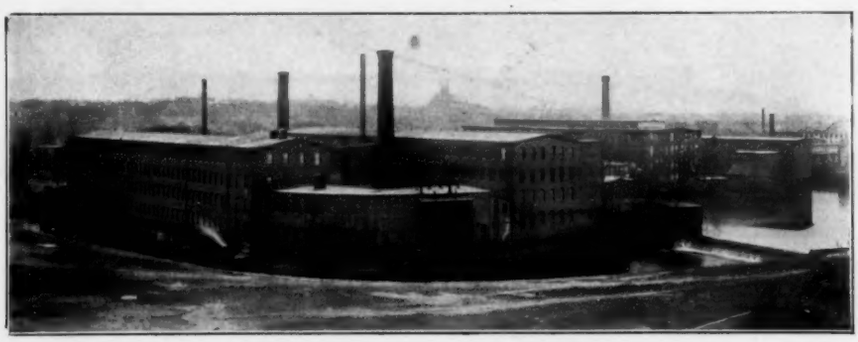

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BALTIMORE, MD.—Plans prepared by Baldwin & Pennington, of this city, submitted in competition, have been accepted for the Sun Building, which is to be erected at Charles and Baltimore Sts. The structure will be four stories high, 52x115 ft.

CHICAGO, ILL.—A mausoleum with crypts patterned after the plan of Westminster Abbey is to be constructed in Montrose Cemetery. The structure is to cost $150,000.

CHICAGO, ILL.—A press report states that the Pennsylvania Railroad Co. is contemplating the erection of a station here, at a cost of $10,000,000.

CHATTANOOGA, TENN.—The Volunteer State Life Insurance Co. contemplates the erection of a 10-story office building to cost $250,000.

CHICAGO, ILL.—The William Grace Co., 1408 Wabash Ave., has the general contract for a two-story addition, 350x190 ft., to the Fair department store building, State, Adams and Dearborn Sts. It will be of steel frame construction, have pressed brick and terra cotta fronts, and cost $300,000. Jenney & Mundie, 171 La Salle St., Architects.

DETROIT, MICH.—The Phoenix Club has purchased a lot on Rowena St., near John R St., and will erect a new home, at a cost of $25,000.

DETROIT, MICH.—Donaldson & Meir, architects for the improvements to the City Hall, have let the contract for the work to Wm. H. Traves, 335 Fifth St., Detroit, for $140,000.

N. Wardrop is preparing plans for remodeling Nos. 18-20 John R St. for Gray & Worcester.

DES MOINES, IA.—Lederer, Strauss & Co. have accepted plans prepared by Hallett & Rawson, 615 Walnut St., of this city, for a building to be erected at Sixth Ave. and Plumb St. It is to be a three-story structure, 66x132. Cost, $35,000.

DALLAS, TEX.—A site has been purchased by the First Methodist Episcopal congregation, and a new edifice will be erected costing $100,000.

DEARBORN, MICH.—Plans have been drawn by Harry J. Rill, 54 Buhl Block, Detroit, for an addition to the building of St. Joseph's Retreat, to be of stock brick and Bedford limestone, four stories and basement, 127x61 ft., slate roof, steam heating, electric lighting, nickel open plumbing, marble floors and wainscoting, hardwood interior finish, etc. Cost, $50,000.

DENVER, COLO.—L. H. Guldman will erect a new five-story modern business block in this city, at a cost of $100,000. F. E. Edbrook, Architect, 510 Opera House Block.

DENVER, COLO.—It is understood that Denver will be selected as the site for the Army and Navy Hospital, which the Federal Government will erect for consumptives, and for which an appropriation of $50,000 has been made.

ELLSWORTH, WIS.—Plans have been prepared by Architects Buechner & Orth, of St. Paul, Minn., for the $85,000 court-house to be built at Ellsworth. It will have ornamental and galvanized iron work, plumbing and steam heating, marble and encaustic tile work, fireproof vaults, etc.

FT. THOMAS, KY.—Bids will be received until January 18th at the office of the chief quartermaster, 415 Pullman Building, Chicago, Ill., for the construction of a guard-house at Fort Thomas, Ky. Plans and specifications may be seen at the above office and at the office of the quartermaster at Fort Thomas. Lieutenant-Colonel W. H. Miller, chief quartermaster.

FOND DU LAC, WIS.—Enough money has been subscribed to insure the erection of a $25,000 Masonic Temple.

HARRISBURG, PA.—Plans have been drawn by Architect Thomas W. Lamb, 32 Park Pl., New York, N. Y., for a theatre building to be erected for C. E. Updegraff, Jr., of Reading, Pa. Seating capacity, 1,600. Cost, $75,000.

INDIANAPOLIS, IND.—Vonnegut & Bohn, Indiana Trust Building, have prepared plans for an eight-story store building to be erected on Meridian and Washington Sts., for L. S. Ayres & Co., at a cost of $200,000.

JOHNSTOWN, PA.—Plans have been prepared by Architect H. M. Rogers, and work will commence in the spring, for a 10-story hotel to be erected at Franklin and Lincoln Sts., for Frank W. Otto, of the Cambria Land & Improvement Company. Cost, $175,000.

JERSEY CITY, N. J.—The Erie Railroad Co. contemplates making extensive improvements at its terminal in this city and is to erect a commodious and ornate station and ferry house, at a cost of $8,000,000. A

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tall tower will mark the building, which will be of brick and iron.

Knoxville, Tenn.—Miller Bros. Company has secured site on which to erect a 7-story, brick and stone building, 75x150 feet. Cost, $200,000.

Kansas City, Mo.—Architects Howe, Hoit & Cutler, 32 Bayard Building, have prepared plant for a $35,000 three-story store and office building, 48x132, to be erected for William E. Minor.

Knoxville, Tenn.—The Alexander A. Scott Brick Co. has been incorporated, with a capital stock of $50,000. A brick plant having a daily capacity of 80,000 bricks will be established.

Kansas City, Mo.—George L. Brown & Son, 221 American Bank Building, have been awarded the contract for the new six-story store building, 72x100, to be erected for Frankel, Frank & Co. Cost, $54,000.

Little Rock, Ark.—Plans are being prepared for a $50,000 apartment-house to be erected by H. L. Remmel. Geo. R. Mann, architect.

Louisville, Ky.—It is stated that J. J. Schlosser, of this city, intends erecting next spring an eight-story building on Chestnut St., at a cost of $80,000.

Merion, Pa.—The chapel and convent for the Mater Misericordæ Convent at Merion, as designed by Architect E. F. Durang, will be built in the Romanesque style, and will cost $150,000. The chapel will measure 78x157 ft., and will contain an auditorium on the first floor and a chapel on the second. The convent will be four stories high, measuring 44x89.10 ft. It will be connected with the chapel by a bridge on the second floor level in front, and a two-story bridge in the rear, on the first and second floors.

Millville, N. J.—The Board of Education will urge the City Council to make appropriations for a new 18-room school building, to replace the old Culver Building, which has been publicly condemned as a death-trap.

Milwaukee, Wis.—The movement to provide an Institution for Technical Education for Mechanics is well under way. It is expected that $100,000 will be necessary to start the project. Plans are being drawn.

Minneapolis, Minn.—Arcania Lodge of Masons will erect a new Masonic Temple at 23d and Central Aves., at a cost of $30,000.

Magnolia, Ark.—Plans, prepared by Hull & Co., Jackson, Miss., have been accepted for the erection of the $52,000 court-house for Columbia County.

Milwaukee, Wis.—Alonzo Burt, president of the Wisconsin Telephone Co., has announced that work will be begun on the company's new eight-story office building next spring. It will be built on 5th St., north of Grand Ave. Cost, between $150,000 and $200,000; equipment will cost $150,000 more.

Mt. Sterling, Ky.—It is stated that the erection of a hotel and hospital building, to cost $50,000, is proposed by H. M. Skillman, D. B. Jones, T. T. Forman and others, of Lexington, Ky., who have purchased the Olympian Springs, near Mt. Sterling.

New Orleans, La.—Bids will be received until April 5 for the $800,000 court-house building. Bernard McCloskey, 219 Carondelet St., is chairman of the court-house commission which will have charge of the plans for the new court-house.

Natchez, Miss.—Bids will be received by the Supervising Architect, Washington, D. C., until Feb. 9, for the construction of U. S. Post-office at Natchez, as advertised in The American Architect.

New York, N. Y.—Morris Osmansky has sold to a builder the southeast corner of Union Ave. and 168th St., upon which a seven-story apartment building will be erected.

Norfolk, Va.—The Raleigh Realty Corporation has been chartered for the erection of 10 dwellings at a cost of $50,000. John K. Peebles is preparing the plans.

Nevada, Mo.—Bids will be received by the Supervising Architect, Washington, D. C., until Feb. 7, 1905, for the construction of the postoffice at Nevada, as advertised in The American Architect.

New York, N. Y.—Hunt & Hunt, architects, have filed plans for a $35,000 residence for Mrs. Augusta E. Stetson, founder of the Christian Science Cult in the city. The residence will be on West 96th St., adjoining the First Church of Christ Scientist. It will be built in the colonial style, three stories, of brick with marble trimmings.

New York, N. Y.—The vacant plot at the

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northeast corner of 52d St. and Fifth Ave. has been purchased by Frederick G. Bourne, who will build two dwelling houses on the site, one for his own occupancy and the other for a friend. The plot has a frontage of 50 feet in the avenue and of 130 feet in the street, and is assessed at $520,000.

OMAHA, NEB.—It is reported that the George A. Fuller Co., Marquette Building, Chicago, proposes to build a $500,000 hotel at Omaha.

PHILADELPHIA, PA.—Edward T. Davis and Felix Isman have purchased for $1,000,000 the property at 13th and Market Sts. The erection of a modern hotel is contemplated.

PHILADELPHIA, PA.—Plans for a six-story apartment house at the southeast corner of Locust and 38th Sts. have been completed by Architect Willis G. Hale. It will contain 48 suites, with kitchens, and will cost about $300,000. The street walls are to be of gray and buff brick with terra cotta decorations. The inside walls will be faced with hollow tile. The columns and floors will be of steel and concrete. The building will be known as the Imperial Apartments and will be fitted up so as to afford every accommodation and comfort to its occupants.

PITTSBURGH, PA.—Plans will be prepared by Architect A. F. Link for erection of engine house in place of engine house No. 7, at Penn. Ave.; cost $20,000. Bids will be received.

PITTSBURGH, PA.—The trustees of the Mary S. Brown Memorial Methodist Episcopal Church of the Twenty-third Ward, have taken title to 38x156 feet of land at Federal Hill St. and Beechwood Ave. The plot was bought as a site for the chapel which Captain S. S. Brown will build.

A choice building site on Squirrel Hill has been purchased by a local man whose name is withheld. The lot faces 100 feet on the west side of Woodland Road, near Wilkins Ave., and has a depth of 200 feet. The new owner will build a handsome residence.

PITTSBURGH, PA.—Architect Edward J. Schellentrager is receiving estimates on two of the group of four apartment houses to be built by a syndicate of New York capitalists at Penn and Homewood Aves, East End. The buildings will cost $150,000 and $100,000 respectively, and will both face on Penn Ave. Both will be 5-story structures with a frontage of 62.5 feet, one being 90 feet and the other 130 feet deep. They will be strictly fireproof in construction and will be built after the most approved eastern methods of apartment house construction.

The work of excavating has started for the first of the group of apartment houses for which the contract was recently awarded to Scott & Krieble. This will be a 6-story fireproof structure and will cost $140,000. Two features of its construction will be a large roof garden and a children's play room. It is expected to have the building ready for occupancy by June 1. Plans for a fourth building, to be erected on the same lot, are now being prepared by Architect E. J. Schellentrager and bids will be taken early in January.

PITTSBURGH, PA.—The Pittsburgh division of the Salvation Army will purchase site and erect, in the near future, a $100,000 building.

PITTSBURGH, PA.—Bids are being received by Architect A. F. Link on a $20,000 engine house to be erected on Penn Ave. near 21st St.

Sub-bids are being taken by Architect Victor E. Kelly on 16 brick veneered houses for John M. Kane, to be erected on Millvale Ave., near Dauphin St., at a cost of about $35,000.

PHILADELPHIA, PA.—A 22-story building is to be erected on the site of the old Bellevue. New York men are interested, but by far the greater portion of the money required to carry through the enterprise has been subscribed by prominent men of this city. The work of demolishing the old hotel will probably begin at once. Verner & Company, bankers and brokers, represent the syndicate which has purchased the property.

POCANTICO HILLS, N. Y.—It is reported that a company has been formed to build a summer hotel in the midst of the great tract which John D. Rockefeller has obtained at Pocantico Hills. Thomas W. Lawson, of Boston, it is said, will be one of the directors.

PHOENIXVILLE, PA.—I. B. Lowrey, Architect, is preparing plans for a church, to cost $60,000, for the Roman Catholic congregation.

ROCHESTER, N. Y.—A huge cold storage warehouse is to be erected on the line of the New York Central in this city by Geo. P. Elliott. It is proposed to build the warehouse adjoining the public market which is nearing completion. The plan includes the erection of a row of stores for the commission merchants. Estimated cost, $250,000.

ROCHESTER, N. Y.—Preparations are being made to remove the four buildings upon the site of the new armory building. Complete plans and specifications are now ready. They will be finally passed upon by the State Commission and, if no changes are to be made, work will be advertised about Jan. 15 and the construction begun in the spring.

ST. JOSEPH, MO.—Rumor states that Eckel & Mann, Commercial Block Building, are the architects for the warehouse which the International Harvester Co., of Chicago, intends erecting at Fourth and Mitchell Aves. Cost, $25,000.

ST. LOUIS, MO.—A site has been secured by the Scharff & Sons Grocery Co., at the southeast corner of 9th St. and Clark Ave., for the erection of a $75,000 storage and warehouse building.

SEATTLE, WASH.—Plans have been received by the school board for school to be built at Summit Ave. and Union St. It will cost between $50,000 and $60,000.

SIOUX CITY, IA.—A press report states that the Great Northern Railway Co. has purchased six blocks in the eastern portion of this city, at a cost of over $250,000, and will build a system of terminals.

SAN ANTONIO, TEX.—Bids will be received at the office of the chief quartermaster, San Antonio, until Jan. 20 for the construction of a brick administration building, including installation of plumbing, hot water heating and wiring for electric lighting at Fort Logan, H. Roots, Ark. Robert R. Stevens, chief quartermaster.

TOPEKA, KAN.—J. C. Holland & Squires, 734 Kansas Ave., have drawn plans for a three-story Y. M. C. A. building, having concrete flooring, slate roof, metal cornices,

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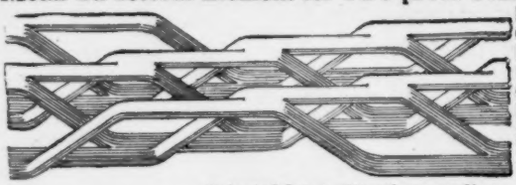

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Toledo, O.—Revised plans have been prepared by Architects Langdon & Hohly, Spitzer Building, for the Hotel Rachel-Ann, to be built by George H. Ketcham, Valentine Building. Cost, $100,000.

Tremont, Ill.—Bids will be received until Feb. 6, for the construction of the new passenger station at this city for the Cleveland, Cincinnati, Chicago & St. Louis Railroad. W. M. Duane, Engineer of Construction, Mattoon, Ill.

Three Rivers, Mich.—J. C. Llewellyn has let the general contract for erection of a $25,000 school to George Rickman & Sons Company, Kalamazoo, Mich. It will be 2-story, 60x100 feet, have pressed brick front, slate roof, steam heat, electric light, pine finish, maple floors, galvanized and structural iron.

Windber, Pa.—The Windber Hospital Association has awarded contract for erection of new hospital to the Windber Lumber Co., this city. Cost, $50,000.

Walkerville, Mich.—A new school building will be erected in the early spring, costing $50,000.

Washington, D. C.—Plans for a new Catholic school for boys have been accepted by the board of trustees. Cost, $300,000. George Truesdell, chairman of the building committee.

Washington, D. C.—Plans have been prepared by Architects, Bruce Price & De Sibour, 1135 Broadway, New York, for additional buildings at the Freedmen's Hospital, to cost $300,000.

White Lake, N. Y.—Mr. Frederick Warde, the actor, will erect here a $30,000 residence, after plans by J. V. Bennis, Baker City, Ore.

Westchester, Pa.—Bids will be received by the Supervising Architect, Washington, D. C., until Feb. 21st, 1905, for construction of U. S. Postoffice at Westchester, as advertised in The American Architect.

Washington, D. C.—Plans, prepared by Bruce Price & De Sibour and John R. Pope Assoc., of New York, for the new Freedman's Hospital in this city, have been accepted by the committee. Cost, $274,644.

Wichita, Kan.—It is stated that J. W. Andrews, of this city, is preparing to erect a $12,000 building to be used as a livery stable.

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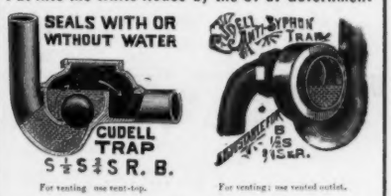

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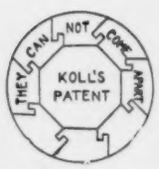

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